

APPENDICES



APPENDIX A

Personnel communications cited in text:

Agajanian, Jeff. USGS-San Diego. 3/5/97. Provided updated flow records for USGS gauge stations 11046000, 11044300, 11046700, 11402000.

Ball, Orville. Research fishery biologist, per. comm. 2/21/96. Interviewed Native Americans on Pauma Reservation about fish.

Boyer, Dave. 1/20/95. Biologist, USMCB Environmental Security, Camp Pendleton, CA. Provided the account of a trout found by game warden in San Mateo Creek.

Brain, Allen. 5/27/97. Many recollections growing up and fishing the Santa Margarita River and De Luz Creek. Sent photo of him and two fish caught in the 1940's.

Brown, Jim. 2/20/96. Fishermen. Recalled catching 15" steelhead and hatchery trout near Fallbrook in 1967-68.

Buck, Slader, 8/3/96. Camp Pendleton Environmental Security biologist.

Chase, Shawn. 1997. Entrix, Inc. Monitored results of fish ladder and fish screen in the Santa Clara River.

Clemmens, Marion. 5/9/1997. Long time resident of Fallbrook, CA. worked on a Santa Margarita River ranch as a teenager and fished the San Mateo Creek in the 1930's (born 1918).

Downie, Scott. 1996. CDFG fishery biologist. Co-authored Habitat Typing Manual, Fortuna, CA.

Giusti, Mike. 8/5/96. CDFG. Conducted native fish surveys in 1995 on De Luz Creek and the San Margarita River. Electra-shocked San Mateo Creek with no steelhead observed. Also provided an account of a warden stocking brown trout in San Mateo Creek in 1988.

Greenwood, Allen. San Diego County trout advocate. Wrote proposal for the restoration of San Mateo Creek. History of trout plants in San Diego County. Provided interviews of several old time San Diego area fishermen.

Henke, Ed. 1/12/95. Keynote Speaker of southern California Steelhead Symposium, 3/28/96. Ventura, CA. Currently lives in Ashland, Oregon.

Holland, Dan. PhD. 2/12/96. Amphibian and southwestern pond turtle expert. Participant in surveys of Base lagoons in the spring of 1996, and the North Fork San Onofre Creek during spring of 1997.

Jenz, Jim. 2/13/97. Santa Margarita River Water-master, Confirmed flow data.

Jessup, David Sr. 2/21/96. Fished San Diego County in the 1940's. Recalled catching rainbows in the San Onofre Creek and Santa Margarita River. Provided notebook on the history of fish plants in San Diego county going back to 1900's.

Jong, Bill. 2/15/96. CDFG fishery biologist, Anadromous Branch, Arcata.

Kramer, Richard. 6/18/97. CDFG warden in the 1940's. Fished San Mateo Creek in the canyon area, Base gravel pits, and estuary.

Maytorena, Marty. 5/7/1997. CDFG game warden for Orange County. Recalled stocking brown trout from Fillmore Hatchery in the San Mateo Creek 1983-1985.

Netti, Steve. 1/18/95. San Diego Fly Fishers. Volunteer for CDFG stream surveys in southern California and provided an account of on adult steelhead from San Mateo Creek in 1991.

Nielsen, Jennifer. 2/15/96 & 8/5/96. Genetics expert. Conducted DNA studies of southern California steelhead. went through the UMMZ fish collection, CAS fish collection and the Smithsonian collection from early Railroad Survey for DNA samples. Stanford University, Hopkins Marine Institute.

Phifer, Dave. 1997. Letter from retired Lt. Col., worked on Camp Pendleton mapped the geology in the 1950's and fished the back country of San Mateo Creek. Caught small trout in the San Mateo Creek near fisherman Camp in the Cleveland National Forest.

Shipek, Florence. PhD. Anthropologist. 5/1/97. Worked extensively on the culture and history of the Pauma, Rincon and La Jolla Indian tribes. Interviewed members of tribes to learn cultural history. Conducted interviews with members of the Luiseno Indian tribe in the 1950's and 1960's who were young in the 1890's and 1900's and harvested large fish (presumably southern steelhead) from the San Luis Rey.

Stromberg, Steve. 9/17/96. Mr. Stromberg, contacted CDFG questioning why the southern extent of southern steelhead was Malibu Creek. CDFG fisheries biologist Alex Vehar, forwarded his name to John Lang CCFWO, and he was interview for this report. Past resident, surfer, fishermen of the southern coast. Observed many steelhead fry in the estuary of San Mateo Creek in August. His last observations were in the late 1980's. Saw a school of them from one foot away by RR. trestle and along the north side of lagoon, patches of algae in water. Got a round in lagoon in a canoe. He also mentioned catching a 15 inch steelhead below Fisherman Camp in the Cleveland National Forest, in 1977. Currently lives in Studio City, Los Angeles, CA.

Sutherland, George. 2/8/96. Trout Unlimited. Contact for ad in local paper requesting steelhead information. Interviewed Tom Tanaka, a farmer on San Mateo Creek who caught steelhead adults in the winter of 1986, near the leased farmland.

Sweet, Samuel S. PhD. 2/20/96. Depart. of Biology, University of California Santa Barbara. Arroyo toad expert.

Ulmer, Linda. 1997. Former CDFG employee. Compiled notes from stream surveys and interviewed fishery biologists for southern California.

Uplinger, Dick. per. comm. 2/21/96 & 8/5/96. CDFG hatchery manager. Requested records of trout plants on the San Margarita River and San Mateo Creek from Mojave River Hatchery, Victorville, CA.

U.S. Forest Service.' Trabuco Ranger District, Corona - No fish surveys.

Vejar, Alex. 1997. CDFG Inland Fishery Biologist, San Diego County. Operated a adult trap at the mouth of San Mateo Creek, Spring 1997. Participated in survey of San Onofre Creek during September 1996.

Woelfel, Dave. 1995, 1997. MS thesis on restoration of San Mateo creek (Woelfel 1991). Provided old photos and references and participated in surveying San Mateo Creek during spring 1997.

Zedler, Paul. 1/18/96. San Diego State University, Ecology Dept. Manages field station at Santa Margarita River Ecological Reserve.

Sources contacted but not cited in text:

Barnhart, Roger. pers. comm. 1/13/95. USFWS Cooperative Fish Unit. Humboldt State University, Arcata CA. Steelhead expert.

Benthin, Randy. pers. comm. 2/15/96. CDFG Region 1 supervisor. Located old journal of fish plants in California.

Bryant, Greg. pers. comm. 1/12/95 & 8/15/96. NMFS biologist, two unpublished reports on southern California steelhead. Account of a (18-19") steelhead from San Mateo Creek that a farmer had pitch-forked in 1990 or 1991. Received a conflicting report from Pat Higgins, and thus we did not include this account in the San Mateo Creek time-line table.

California Academy of Science Fish Collection, San Francisco. 8/10/96. Bruce Oppenheim, personally conducted the searched of the Academy's specimen collection for *Salmo gairdneri* Richardson, *Salmo gairdneri gairdneri*, *S. g. nelsoni*, *S. g. irideus*, *Oncorhynchus mykiss*.

California Department of Fish and Game. 4/25/96. Region 5, Long Beach Library. Searched for old stream survey files, notes, and correspondence regarding Base streams.

California Department of Fish and Game. Natural Diversity Data Base search for *Salmo gairdneri* Richardson, *Salmo g. gairdneri*, *S. g. nelsoni*, *S. g. irideus*, *Oncorhynchus mykiss* in southern California. 8/12/96.

Cardone, Al. CDFG. per. comm. 2/20/96. Provided names and contacts for old stocking records.

Catania, David. California Academy of Science, pers. comm. 2/20/96. Fish collection curator, conducted computer search for southern California steelhead and *Salmo gairdneri* Richardson, *Salmo g. gairdneri*, *S. g. nelsoni*, *S. g. irideus*, *Oncorhynchus mykiss*. A few records from southern California. (Note: only one-third of the specimens actually in computer data base).

Chubb, Sara. per. comm. 2/10/97. Biologist, Los Padres National Forest. Mentioned Cindy Carpanzo's report and Kathleen Matthews paper on habitat usage by steelhead in pools, Pacific Southwest Range and Experimental Station, Berkeley.

Edmundsen, Jim. pers. comm. 1/20/95. California Trout.

Eigenmann, C.H. 1892. The fishes of San Diego, California. Proceedings of the National Museum. Vol. 15(897):123-143.

Foreman, Terry. pers. comm. 2/1/95. CDFG district biologist, Ramona, CA.

Gerstrung, Eric. pers. comm. 1/11/95. CDFG biologist in charge of summer steelhead.

Harper, Brooks. pers. comm. 8/5/96. USFWS, Honolulu, Hawaii. Surveyed southern California streams. Recalled electro-shocking Sespe Creek, Ventura County.

Hayne, Michael. CDFG. per. comm. 2/21/96. Hatchery stocking records.

Higgins, Pat. 1/20/97. Fishery Consultant, Arcata CA. Authored report to Trout Unlimited on restoring San Mateo Creek. Reviewed files on San Mateo Creek and Santa Margarita River.

Holmgren, Mark. University of California Santa Barbara, Museum of Zoology. pers. comm. 1/18/95. Has only a teaching collection.

Humboldt State University. USFWS, Fishery Cooperative Unit. Library search.

Humboldt State University. Library search, Humboldt Room, depository for NMFS steelhead status review.

Humboldt State University Fish Collection. 5/30/96. Search of museum specimens for southern California steelhead.

Malloy, Mike. Office of Water Resources, Camp Pendleton. 10/24/96. Precipitation updates for the Lake O'Neill, Case Springs, San Mateo Creek, Cristianitios, McGee and Target range 408.

McEwan, Dennis. 1/13/95. CDFG, Sacramento. Authored: "Steelhead Management Plan".

Reck Don. National Marine Fisheries Service, pers. comm. 1/18/95. Regarding the effect of steelhead listing.

Pardy, Linda. pers. comm. 11/27/96. San Diego Water Quality Control Board. Mentioned Bruce Campbell, of San Diego Fly Fishers chairman, caught trout in Santa Margarita River in 1986. Provided response to comments regarding the cold water designation and beneficial use of southern California streams. Mentioned Florence Shipek as a source to contact.

Parmenter, Steve. pers. comm. 2/1/95. CDFG, Bishop, CA. Wild Trout Program. Coordinated Camp Pendleton habitat typing field work. Provided TempMenter data from the San Mateo Creek, below Fisherman Camp. Conducted electro-shocking surveys on San Mateo Creek in 1994.

Reese, Devan. pers. comm. 2/12/96. USFS, Pacific Southwest Range & Experimental Station. Worked with Dan Holland on Base, arroyo toad and trout predation question.

Sommarstrom, S., pers. comm. 4/96. Private consultant. Wrote Camp Pendleton report: Multiple Land Use Management Plan. 1995.

Sevgal, Jeff. Los Angeles County Natural History Museum. pers. comm. 1/17/95. No steelhead specimens from southern California.

San Diego Historical Society. 12/02/96. Search for references to trout and salmon runs in San Diego County and use by Native Americans in their diets. Notes from interview with Mauricio "Sonny" Magante, a Native American from the Pauma Reservation (Oral History Program) and early maps of streams on Base.

Shelton, Sally, Director. San Diego Natural History Museum. pers. comm. 1/17/95. No fish collection.

Woodhouse, Charles, Director of Zoology, Santa Barbara Natural History Museum. pers. comm. 1/17/95. All marine fish species.

Newspapers contacted:

San Diego Union
Sun Post Reporter
Orange County Register
North County Times
Temecula California
Fallbrook-Enterprise

Newspaper Articles Reviewed:

Los Angeles Press Release, 3 July, 1962. Trout fingerlings stocked in four southland streams. (CDFG stream survey files).

Los Angeles Press Release, 5 May 1964. Redeye bass stocked in Santa Margarita. (CDFG 1932-1952).

Los Angeles Times. 17 Feb. 1978. Growing Hatchery provides anglers with trout.

Los Angeles Times. 3 Sept. 1981. Robert Weiss, Dried creek may be cemetery for trout.

Los Angeles Times. 24 Sept. 1986. Judy Pasternak, Steelhead trout have returned to Southern California, tests show.

Los Angeles Times. 13 Nov. 1986. State takes steps to protect steelhead trout.

Los Angeles Times. 11 Nov. 1988. Stewart Allen, Malibu's steelhead are up the creek, without a ladder, Special Feature.

Los Angeles Times. 1 May 1989. Plan would mean steady flow for Santa Margarita River.

Santa Ana Daily Register. (now the Orange County Register) 18 May 1916. Trout this year larger than in 1915, is verdict.

Santa Ana Daily Register. 23 March 1916. Banner season for trout is predicted for county, by Victor Walker.

The San Diego Union. 13 Nov. 1880. A list of the fishes of San Diego County, CA. Presented by Miss Rosa Smith. pg 4:3-4. (#59. Salmo iridea- Brook trout from Pala near Smith Mtn)

The San Diego Union. 27 June 1885. The Silver Trout.

The San Diego Union. 14 Sept. 1893. Trout for San Diego. (45,000 trout shipped from Sisson Hatchery to the back country)

The San Diego Union. 25 April 1897. Marine Intelligence. (Silver Trout spotted in Mission Bay)

The San Diego Union. 24 May 1936. History of trout plants in San Diego County.

The San Diego Union. 3 Jan. 1964. Fishin' with ear, nose: giant rainbows hide behind brushy barricade. pg 6-10. (Note: photo of San Margarita River above Fallbrook with typical riparian before floods).

The San Diego Union. 28 Feb. 1965. Stream trout limit now 10. (Report of steelhead and silver salmon taken inside harbor)

The San Diego Union. 2 Feb. 1966. State trout plant policy not in step with times.

The San Diego Union. 27 April 1966. Outdoor Notebook. (200 lbs/
1000 trout planted in San Margarita River at Willow Glen Rd.
above Fallbrook)

The San Diego Union. 19 April 1995. Santa Margarita River, by
Scott La Fee. Section E1, and E12.

The San Diego Union. 14 October 1954. (from Hubbs papers, MC5,
70/37) photo of three pound trout caught in San Luis Rey River
below Henshaw dam.

San Diego Fly Fishers Newsletter: May 1995. Flyfishing the Rio Santo
Domingo in Mexico, by Jim Brown.

APPENDIX B

Reference sources cited numerically in Table 4 through Table 8.

1. Newspaper article: Santa Ana Daily Register. (now Orange County Register) dated 18 May 1916. "Trout this year larger than in 1915, is verdict".
2. Newspaper article: Santa Ana Daily Register. (23 March 1916). "Banner season for trout is predicted for county" by Victor Walker.
3. (UMMZ) University of Michigan, Museum of Zoology, Fish Collection. 1996. Internet Search of *Salmo gairdneri* in California. Catalog #132968, 132967, 132964, and 132957.
4. California Dept. of Fish & Game. Fish stocking record for San Mateo Creek: August 7, 1939. From stream survey files, Region 5, Long Beach Library.
5. Letter from Willard Jarvis, Senior Fisheries Biologist, to Bureau of Fish Conservation (USFWS) summarizing observations on Camp Pendleton streams, dated June 15, 1946. Located in stream survey files for San Mateo Creek, CDFG Long Beach Library.
6. California Department of Fish and Game. 1932-1979. Stream survey files: Fern Creek, tributary of De Luz Creek 1932; De Luz Creek 1942; San Mateo Creek 1946, 1947, and 1950; Fletcher Creek, tributary to North Fork San Onofre Creek 1950; including stocking records and field notes. Region 5, Long Beach Library.
7. CDFG. 1979. Stream inventory by Linda Ulmer and Gwen Lattin. Long Beach Library.
8. CDFG. 1996a. Mojave River Hatchery Stocking Records for San Mateo Creek and San Margarita River from 1954-1983.
9. Giusti, Mike. per. comm. 1996. CDFG biologist, Chino. Native fish surveys in southern California.
11. Andrews, Stanley. 1933. Trout plants in San Diego County, compilation of field notes from 1917 to 1933. Copied from the files of Dr. David Jessup Sr., La Mesa, CA, pp 49.
12. Los Angeles Press Release: 3 July 1962. "Trout fingerlings stocked in four southland streams". (CDFG 1932-1952).

13. Los Angeles Press Release: 5 May 1964. "Redeye bass stocked in Santa Margarita". (CDFG 1932-1952).
14. U.S. Marine Corps. June 26 1969. Fishery stocking report from Camp Pendleton Natural Resources Section (Wildlife). Camp Pendleton, CA.
15. U.S. Marine Corps. 1994. Camp Pendleton. Fish management log from Oct. 20, 1970 to Dec. 6, 1973. R.B. Freeman (Unpublished). 121 pp.
16. Bureau of Sport Fisheries and Wildlife. 1974. Annual Project Report, Camp Pendleton Fishery Management Program by Gary Rankel, Las Vegas, Nevada. (In USFWS Pulgas Lake historical file).
17. U.S. Marine Corps. 1974. Film Release. Stocking salmon at Camp Pendleton: Official U.S. Marine Corps Film. Released by Department of Defense, March 11, 1974. Release No. 15-74.
18. Bruce Campbell, San Diego Fly Fishers (SDFF) chairman, mentioned to Linda Pardy of the California Regional Water Quality Control Board-San Diego Region, that he had caught trout in 1986 on the upper San Margarita River.
19. Dan Ryan and John Waters, local fishermen who caught steelhead and trout in San Mateo, San Juan, Trabuco, De Luz creeks, and San Luis Rey River from 1932-1942. Interviewed by Allan Greenwood (San Diego Trout) on June 11, 1997. USFWS received a written copy of the transcript from the interview with Mr. Waters.
20. Richard Kramer, retired CDFG game warden who worked on the streams mentioned in this report in the 1940's. Interviewed by Allen Greenwood, San Diego Trout, on 6/18/97. Also, interviewed and quoted in (Woelfel 1991).
21. CDFG. San Mateo Creek stream survey: July 27 & 28, 1996. Draft report from Steve Parmenter. Bishop, CA. 2 pp.
22. CDFG. 1940. Department of Natural Resources, Division of Fish and Game. Field correspondence from: D.A. Claton; to: Bureau of Fish Conservation. Survey of Orange County Streams. February 11, 1940.
23. Maytorena, Marty. 5/7/1997. CDFG game warden for Orange County. Recalled stocking brown trout from Fillmore Hatchery in the San Mateo Creek 1983-1985.

APPENDIX C

Result of computer search of the Scripps Institute of Oceanography
Fish Collection, La Jolla, CA. for *Salmo gairdneri*.



Scripps Institute of Oceanography Fish Collection, La Jolla, Ca.
04/25/96 Computer Search

For *Salmo gairdneri*

Collection	Qty	Size (mm)	Status	Location	Latitude	Longitude	Depth Cap.
SIO 44-1	2	0	G	Fountain Crk, trib. to Arkansas River	38°40.0'N	104°30.0'W	0-2 ft
SIO 45-81	5	135-270	G	headwaters of Rio San Rafael, Mexico	31°37.0'N	115°37.4'W	
SIO 48-212	2	0	D	Merced River: W boundary of Yosemite Park	37°40.0'N	119°45.0'W	to 2 ft
SIO 48-213	2	0	G	Merced River: ca 0.5 mi below Cascade Creek	37°40.0'N	119°45.0'W	to 4 ft
SIO 48-214	5	0	G	Merced River: ca 0.1 mi above Sentinel Bridge	37°40.0'N	119°45.0'W	to 3 ft
SIO 49-114	2	128-154		Rio Gavilan: 7 mi SW of Pacheco	29°00.0'N	105°00.0'W	
SIO 49-121	10	0		Vancouver Island: French Creek	49°23.0'N	124°27.0'W	
SIO 50-154	1	0		Alamo Creek, trib. to Cuyama River	37°42.0'N	121°55.0'W	
SIO 52-80	5	0	D	Whiskey Creek, trib. to Crowley Lake	37°37.0'N	118°44.0'W	to 2 ft
SIO 52-81	2	0	D	Hilton Creek mouth	36°31.0'N	117°57.0'W	
SIO 53-100		0	D	W Fork of Mojave River, below junction	35°06.0'N	116°04.0'W	
SIO 56-54	1	166		Highland Canal, branch of All-American Canal	32°50.0'N	115°00.0'W	
SIO 56-55	1	171		All-American Canal at Drop 2	32°50.0'N	115°00.0'W	
SIO 58-387	1	0		Horseshoe Lake at campground	40°28.4'N	121°19.9'W	
SIO 60-490	2	111-145		Smith Creek	34°14.0'N	119°16.0'W	
SIO 60-493	1	231		Yosemite National Park, Emeric Lake	37°45.0'N	119°35.0'W	
SIO 61-29	1	525	*	3 mi N of Rosarito Beach, Mexico	32°23.0'N	117°04.2'W	60yds offshore
SIO 61-443	20	25-137		Snaking River at Quesnel, trib. to Nazko River	53°07.0'N	123°34.0'W	
SIO 63-270	1	44		Mackinac Straits, Green's Creek	45°49.0'N	084°42.0'W	
SIO 77-81	4	110-130		Atnarko River, Stule	52°22.0'N	126°02.0'W	
SIO 80-17	2	148-149		San Simeon Creek, San Luis Obispo	35°39.0'N	121°11.0'W	2 ft
SIO 80-93	2	75-75		Canterbury Province, Rakaia Drainage	44°00.0'S	171°45.0'E	to 2 ft
SIO 80-273	1	409	*	Ocean Beach, N of Pler, San Diego	32°46.0'N	117°13.0'W	on beach
SIO 83-104	3	180-200		Big Meadow Campground, Rock Creek	37°55.0'N	120°58.0'W	surface

For *Oncorhynchus mykiss*

SIO 49-121	1	37		Vancouver Island: Mill Stream	49°08.0'N	123°54.0'W	
------------	---	----	--	-------------------------------	-----------	------------	--

For *Salmo irideus*

0



APPENDIX D

Habitat Typing excerpt from CDFG Habitat
Restoration Manual (Flosi and Reynolds 1994)



CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

HABITAT TYPING

The habitat typing procedure presented is a standardized methodology that physically describes 100 percent of the wetted channel. It is a composite of systems principally developed or modified by other investigators and compiled in part by Trinity Fisheries Consulting on contract to DFG.

Habitat types are described according to location, orientation, and water flow. The attributes distinguishing the various habitat types include over-all channel gradient, velocity, depth, substrate, and the channel features responsible for the unit's formation.

A basin-level habitat inventory is designed to produce a thorough description of the physical fish habitat. Basin-level habitat classification is on the scale of a stream's naturally occurring pool-riffle-run units. The length of a habitat unit depends on stream size and order. For basin-level habitat inventory, homogeneous areas of habitat that are equal or greater in length than one wetted channel width are recognized as distinct habitat units.

The information provided by habitat and channel typing, and biological information collected during spawning surveys and/or juvenile rearing surveys aids in determining if critical habitat needs of a target species are lacking, and if there are areas where improvements can be made.

There are four levels of classification used to describe physical fish habitat. Each higher level in the sequence includes more descriptive categories of habitat types (Figure 10). Level I categorizes habitat into riffles or pools. Level II categorizes riffles into riffle or flatwater habitat types, for a total of three types (riffle, pool, and flatwater). Level III further differentiates riffle types on the basis of water surface gradient (riffle or cascade), and pool types according to their location in the stream channel (main channel, lateral scour, or backwater). At level IV, pools are categorized by the cause of formation (obstruction, blockage, constriction, or merging flows); riffles are categorized by gradient, and cascades by gradient and substrate type; and flatwaters are categorized by depth and velocity. Level IV habitat types are the 24 habitat types listed below.

Prior to conducting an inventory, the level of data collection necessary to meet the needs of the investigation should be established. Habitat typing at level IV will provide the greatest detail and the most complete description of existing habitat. This data can later be aggregated into broader levels of habitat classification if detail is found to be excessive.

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

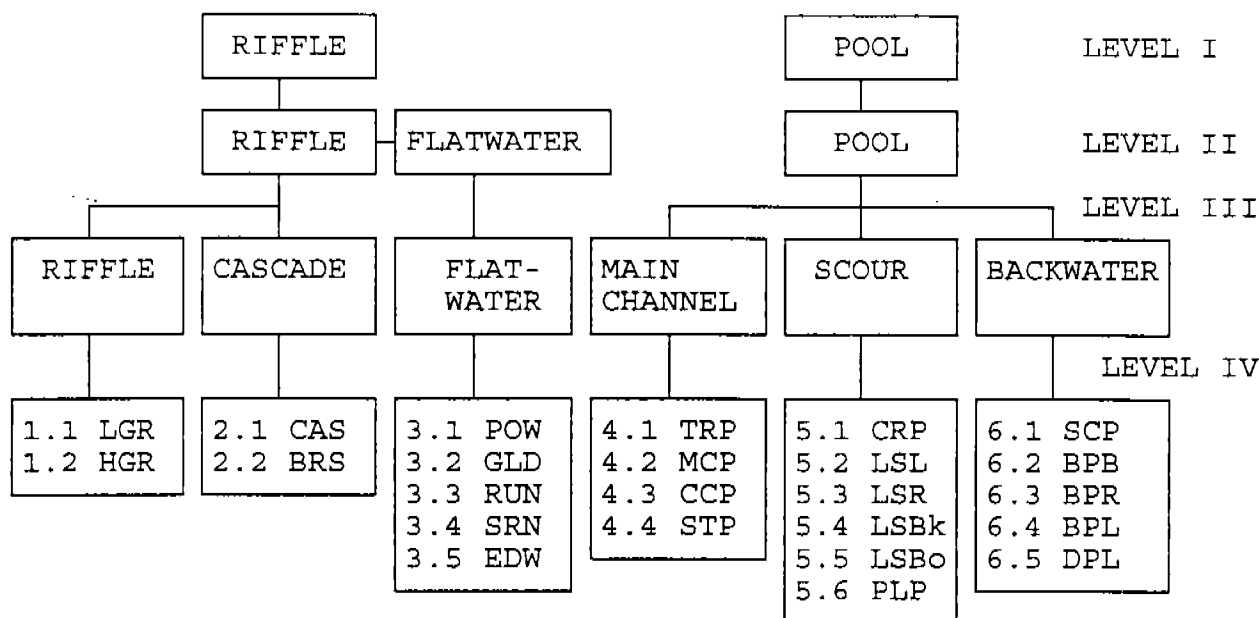


Figure 10. Habitat types hierarchy.

Generally a stream will not contain all 24 habitat types. The mix of habitat types will be reflective of the overall channel gradient, flow regime, cross-sectional profile, and substrate particle size. Basins that exhibit a wide range in channel gradient will also have a broad mix of habitat types. Stratifying a basin by channel types helps to predict the location of certain habitat types.

Project-level habitat typing is used to evaluate and quantify changes in habitat as the result of fish habitat restoration/enhancement projects. It will provide insight on the relationship between channel features and habitat development. For project-level habitat typing, the minimum size of a habitat unit is equal to the width of the wetted stream channel. For a more detailed habitat analysis, the units can be reduced. The habitat unit size used depends on the nature and objective of the particular study. Regardless of unit size, Level IV habitat types should be used.

Habitat typing is intended to yield detailed information that can be used for fisheries management. Basin-wide habitat typing can provide a variety of data. Some important applications are:

- Physically describe 100 percent of the habitat in a basin.
- Provide baseline data to evaluate habitat responses to restoration efforts.
- Facilitate restoration planning and fisheries management.
- Determine transect locations for Instream Flow Incremental Methodology (IFIM) modeling based on habitat availability and accessibility.

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

Definition of Habitat Types

The following list of habitat types and their hierarchy has been adapted from the original system developed by Bisson, et al. (1982), modified by Decker, Overton, et al. (1985), and Sullivan (1988).

Level I Habitat Types:

RIFFLE:

(Riffle, Cascade, Flatwater)

POOL:

(Main Channel Pool, Scour Pool, Backwater Pool)

Level II Habitat Types:

RIFFLE:

(Low-Gradient Riffle, High-Gradient Riffle, Cascade, Bedrock Sheet)

FLATWATER:

(Pocket Water, Run, Step Run, Glide, Edgewater)

POOL:

(Plunge Pool, Mid-Channel Pool, Dammed Pool, Step Pool, Channel Confluence Pool, Trench Pool, Lateral Scour Pool Root Wad Enhanced, Boulder Formed, Bedrock Formed, and Log Enhanced, Corner Pool, Secondary Channel Pool, Backwater Pool Boulder Formed, Root Wad Formed, and Log Formed)

Level III and Level IV Habitat Types:

The three or four letter abbreviations in parentheses, (***), are the standardized abbreviations adopted by DFG. The three digit numbers in brackets, [*. *], are the standardized numbers adopted by DFG. The numbers in braces, {**}, are the numbers listed in the Pacific Southwest Region Habitat Typing Field Guide, USDA-USFS.

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{1}
High Gradient Riffle	(HGR)	[1.2]	{2}

CASCADE

Cascade	(CAS)	[2.1]	{3}
Bedrock Sheet	(BRS)	[2.2]	{24}

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOL

Trench Pool	(TRP)	[4.1]	{8}
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOL

Corner Pool	(CRP)	[5.1]	{22}
L. Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
L. Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
L. Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
L. Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{9}

BACKWATERPOOLS

Secondary Channel Pool	(SCP)	[6.1]	{4}
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{5}
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{6}
Backwater Pool - Log Formed	(BPL)	[6.4]	{7}
Dammed Pool	(DPL)	[6.5]	{13}

DRY STREAMBED

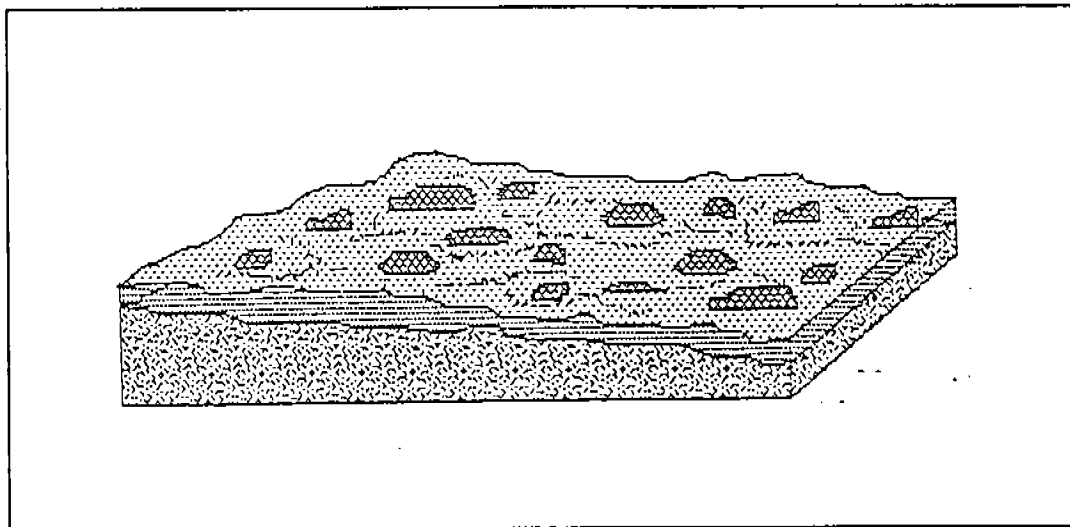
Dry	(DRY)	[7.0]	
-----	-------	-------	--

Level IV Habitat Type Descriptions:

The following habitat type descriptions are taken from the Pacific Southwest Region Habitat Typing Field Guide, USDA-USFS.

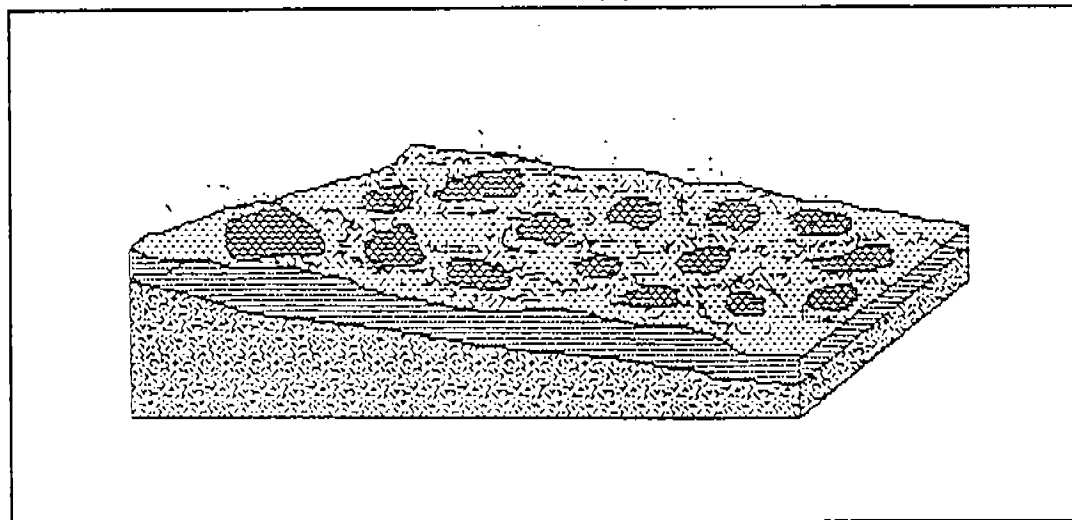
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

LOW-GRADIENT RIFFLE (LGR) [1.1] {1}



Shallow reaches with swiftly flowing, turbulent water with some partially exposed substrate. Gradient $< 4\%$, substrate is usually cobble dominated.

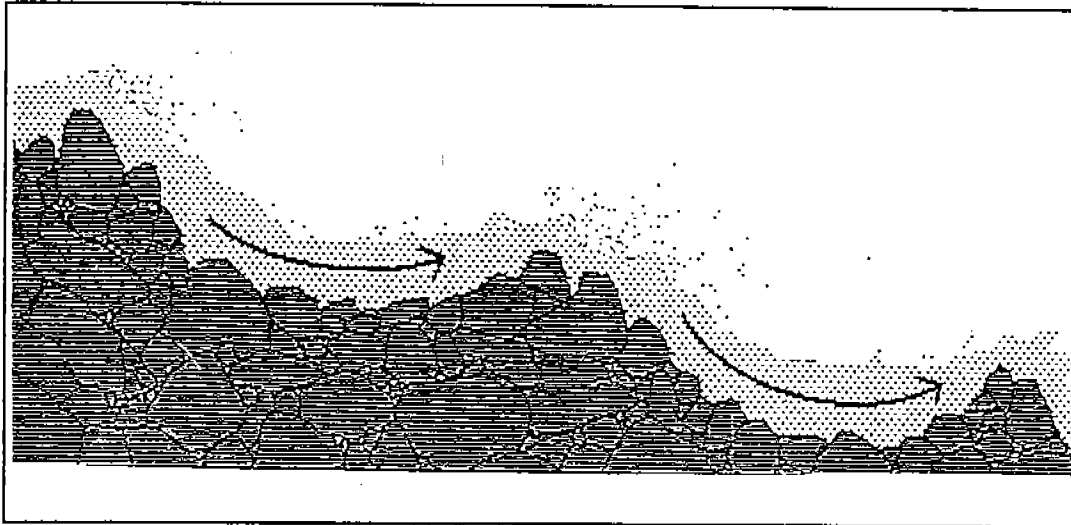
HIGH-GRADIENT RIFFLE (HGR) [1.2] {2}



Steep reaches of moderately deep, swift, and very turbulent water. Amount of exposed substrate is relatively high. Gradient is $> 4\%$, and substrate is boulder dominated.

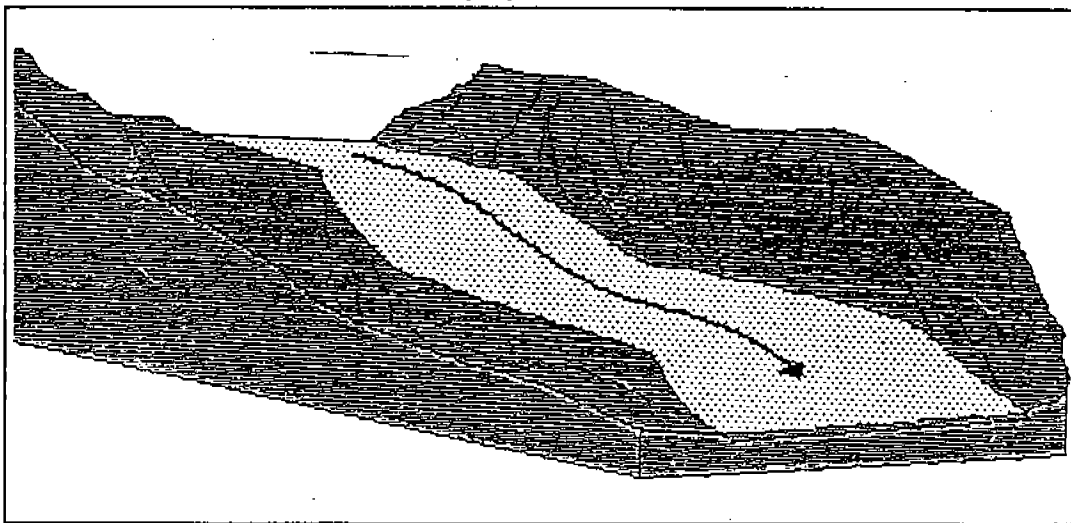
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

CASCADE (CAS) [2.1] {3}



The steepest riffle habitat, consisting of alternating small waterfalls and shallow pools. Substrate is usually bedrock and boulders.

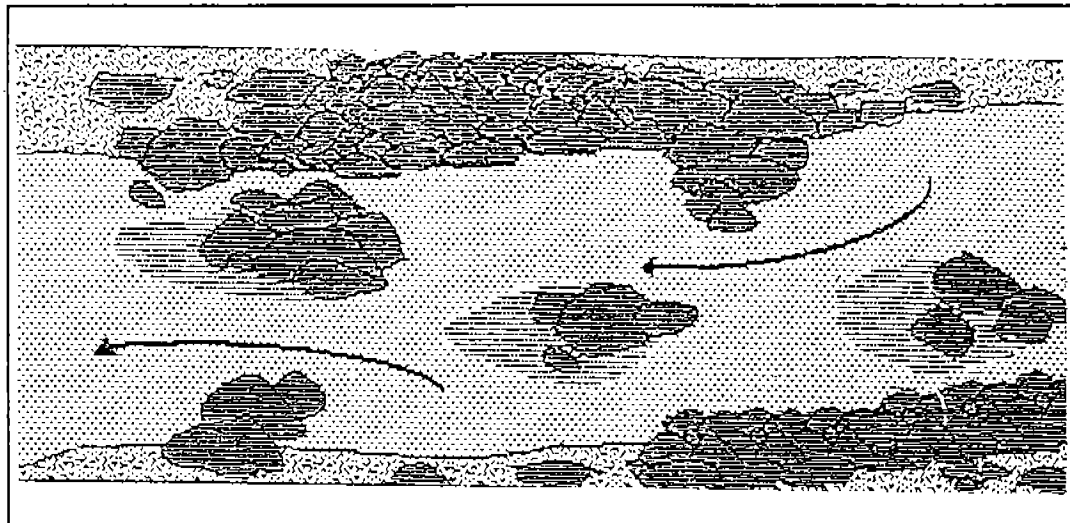
BEDROCK SHEET (BRS) [2.2] {24}



A thin sheet of water flowing over a smooth bedrock surface. Gradients are highly variable.

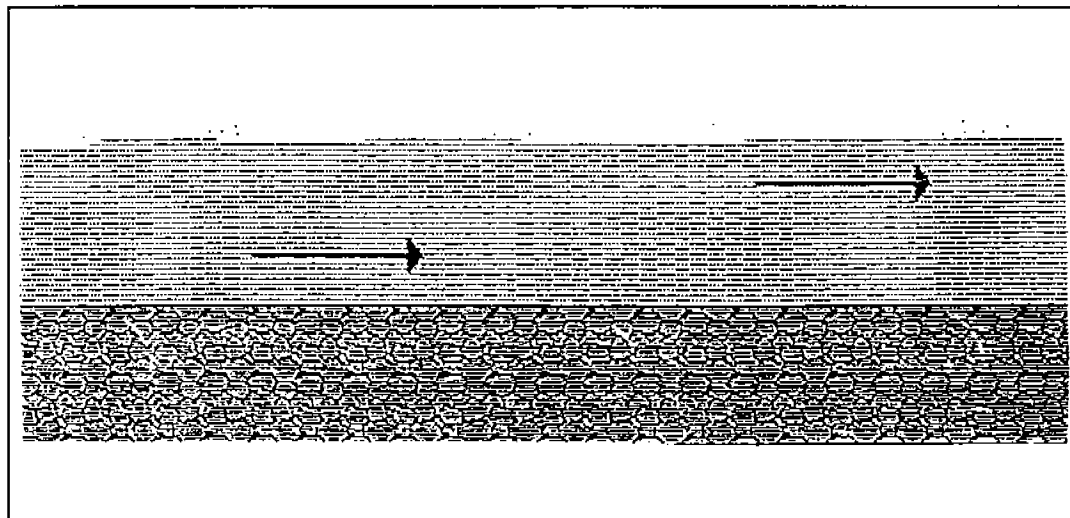
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

POCKET WATER (POW) [3.1] {21}



A section of swift-flowing stream containing numerous boulders or other large obstructions which create eddies or scour holes (pockets) behind the obstructions.

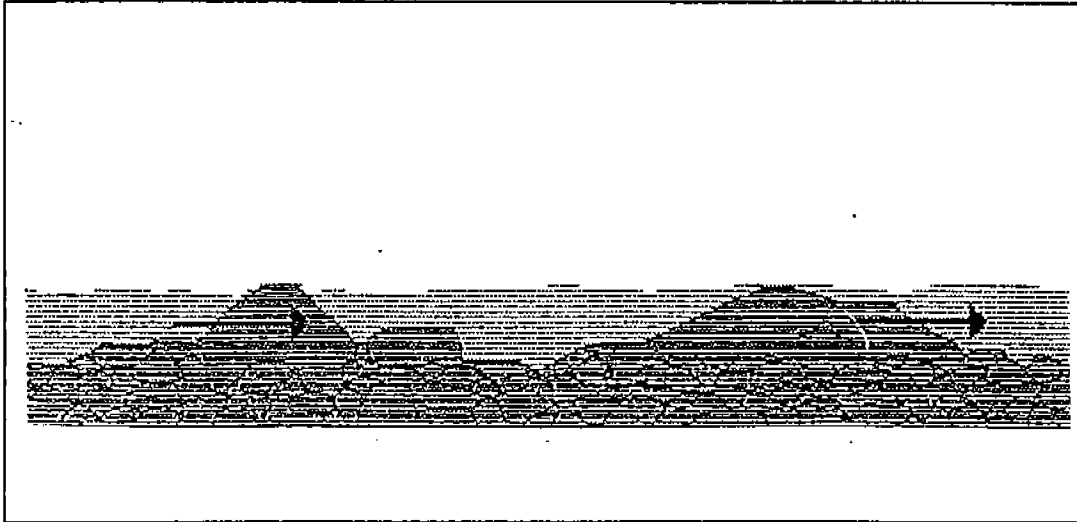
GLIDE (GLD) [3.2] {14}



A wide, uniform channel bottom. Flow with low to moderate velocities, lacking pronounced turbulence. Substrate usually consists of cobble, gravel, and sand.

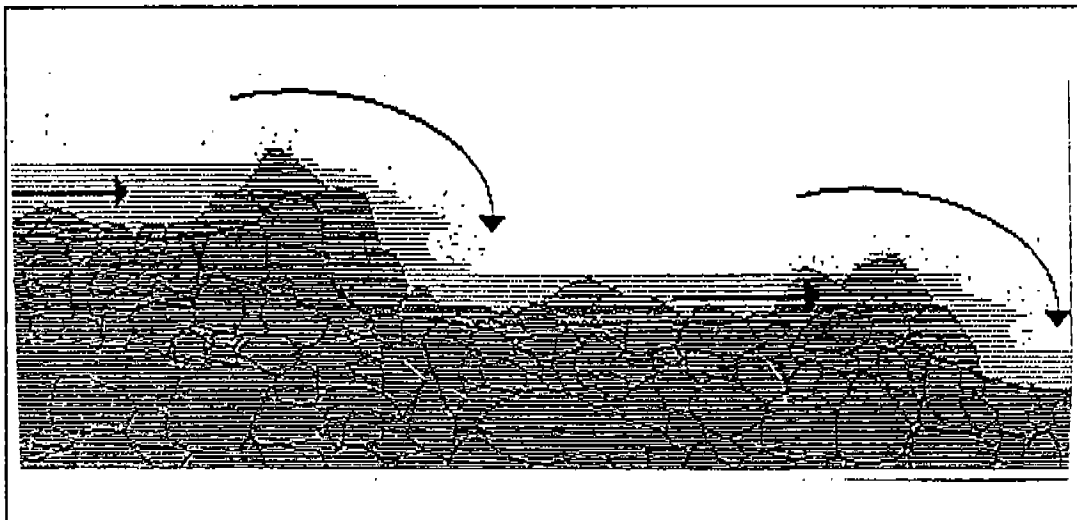
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

RUN (RUN) [3.3] {15}



Swiftly flowing reaches with little surface agitation and no major flow obstructions. Often appears as flooded riffles. Typical substrate consists of gravel, cobble, and boulders.

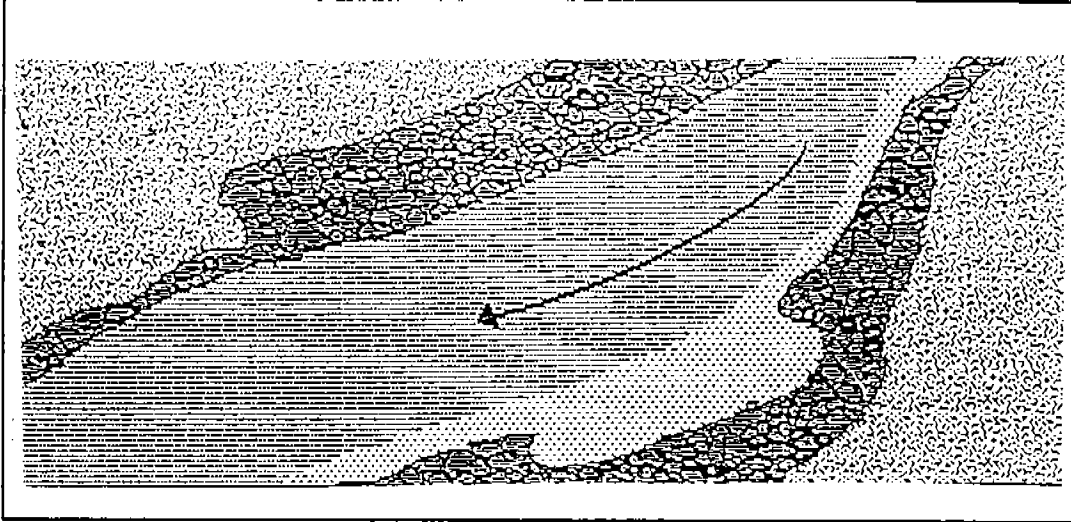
STEP RUN (SRN) [3.4] {16}



A sequence of runs separated by short riffle steps. Substrate is usually cobble and boulder dominated.

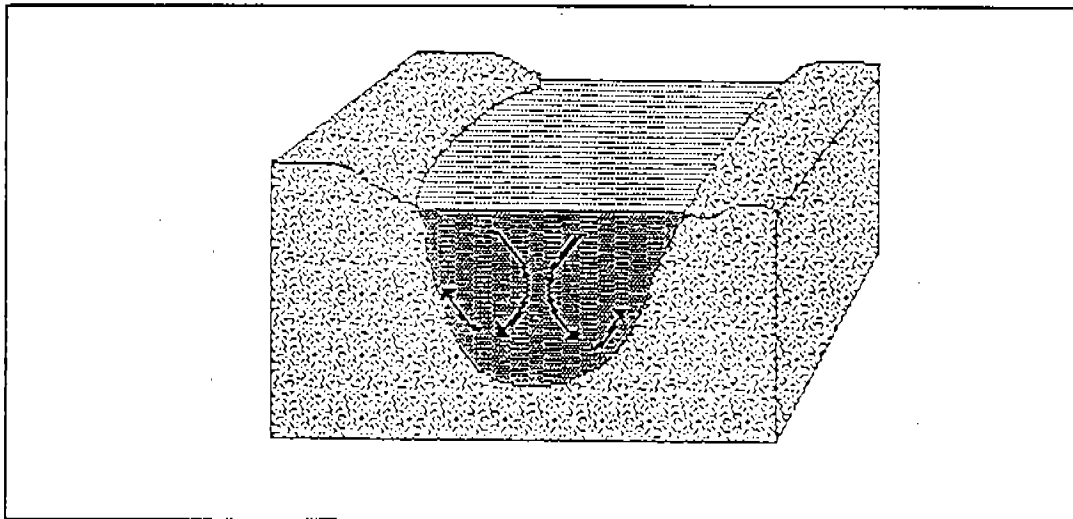
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

EDGEWATER (EDW) [3.5] {18}



Quiet, shallow area found along the margins of the stream, typically associated with riffles. Water velocity is low and sometimes lacking. Substrate varies from cobbles to boulders.

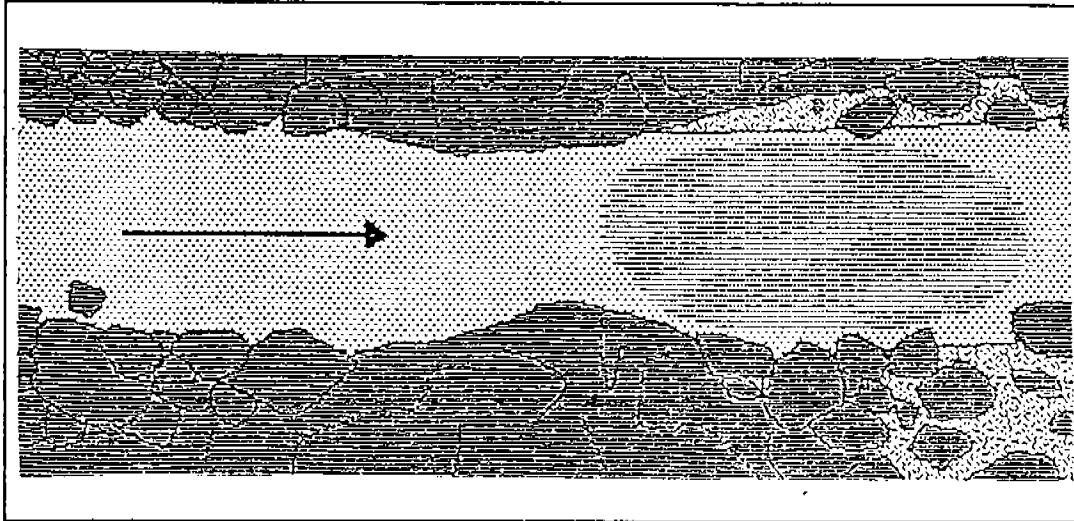
TRENCH POOLS (TRP) [4.1] {8}



Channel cross sections typically U-shaped with bedrock or coarse grained bottom flanked by bedrock walls. Current velocities are swift and the direction of flow is uniform.

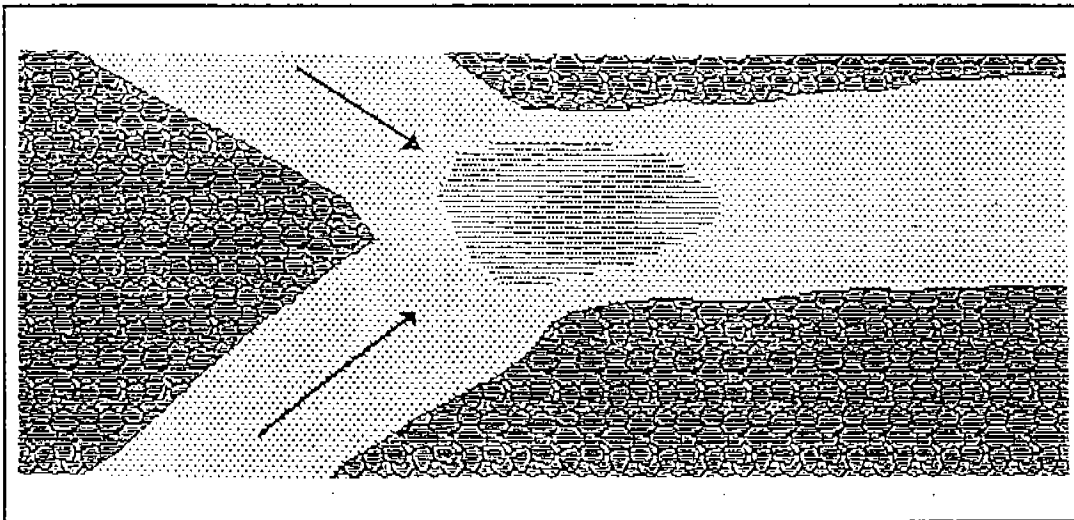
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

MID-CHANNEL POOL (MCP) [4.2] {17}



Large pools formed by mid-channel scour. The scour hole encompasses more than 60% of the wetted channel. Water velocity is slow, and the substrate is highly variable.

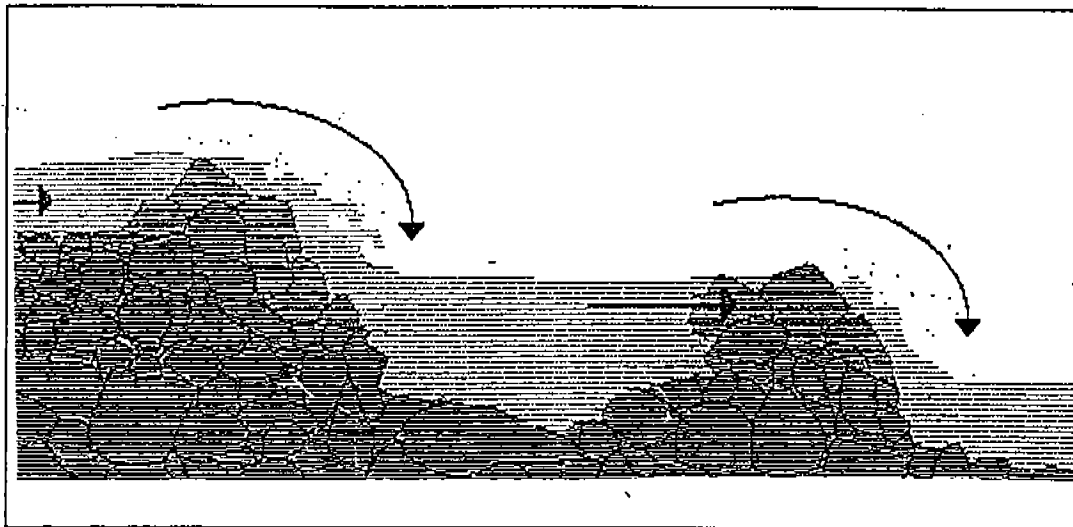
CHANNEL CONFLUENCE POOL (CCP) [4.3] {19}



Large pools formed at the confluence of two or more channels. Scour can be due to plunges, lateral obstructions or scour at the channel intersections. Velocity and turbulence are usually greater than those in other pool types.

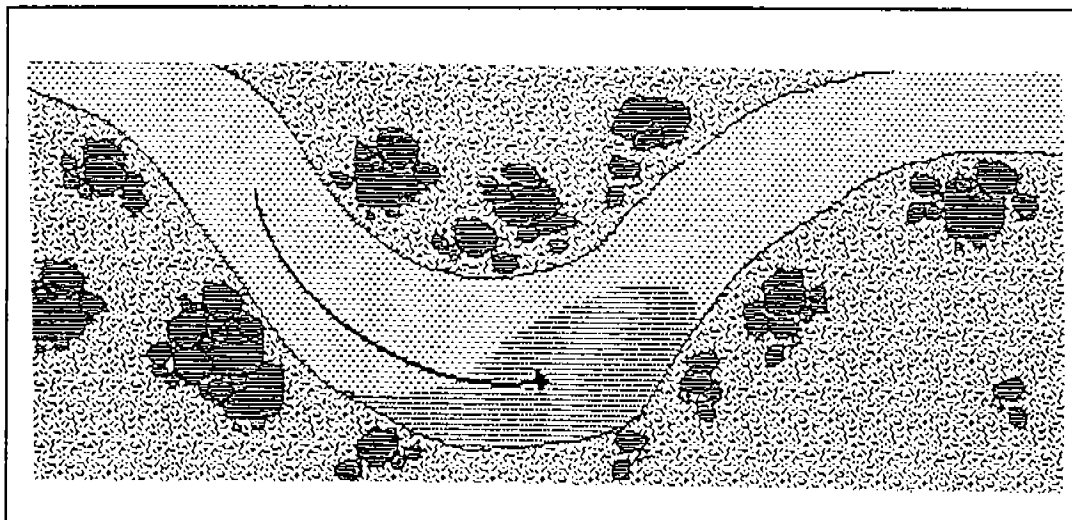
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

STEP POOL (STP) [4.4] {23}



A series of pools separated by short riffles or cascades. Generally found in high-gradient, confined mountain streams dominated by boulder substrate.

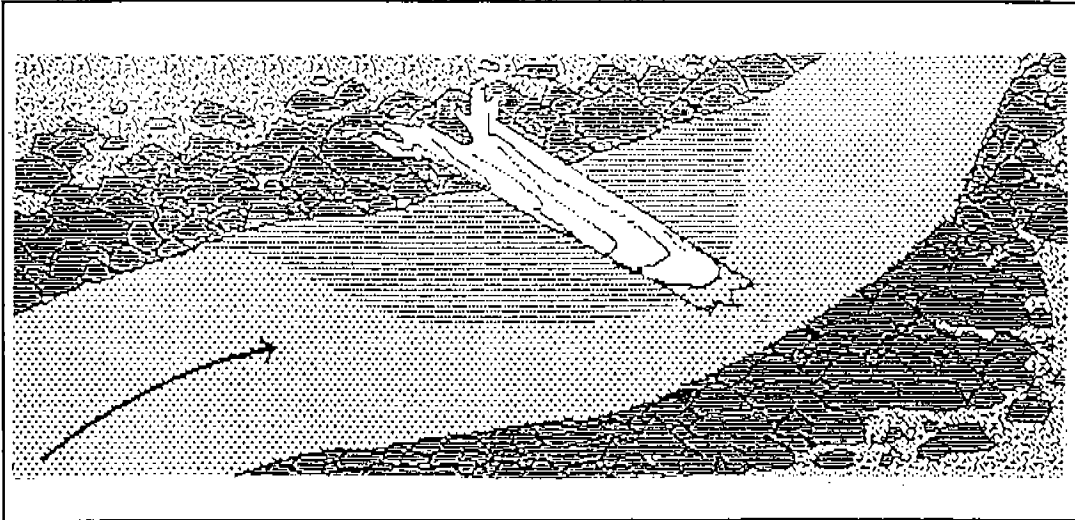
CORNER POOL (CRP) [5.1] {22}



Lateral scour pools formed at a bend in the channel. These pools are common in lowland valley bottoms where stream banks consist of alluvium and lack hard obstructions.

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

LATERAL SCOUR POOL - LOG ENHANCED (LSL) [5.2] {10}



Formed by flow impinging against a partial channel obstruction consisting of large woody debris. The associated scour is generally confined to < 60% of the wetted channel width.

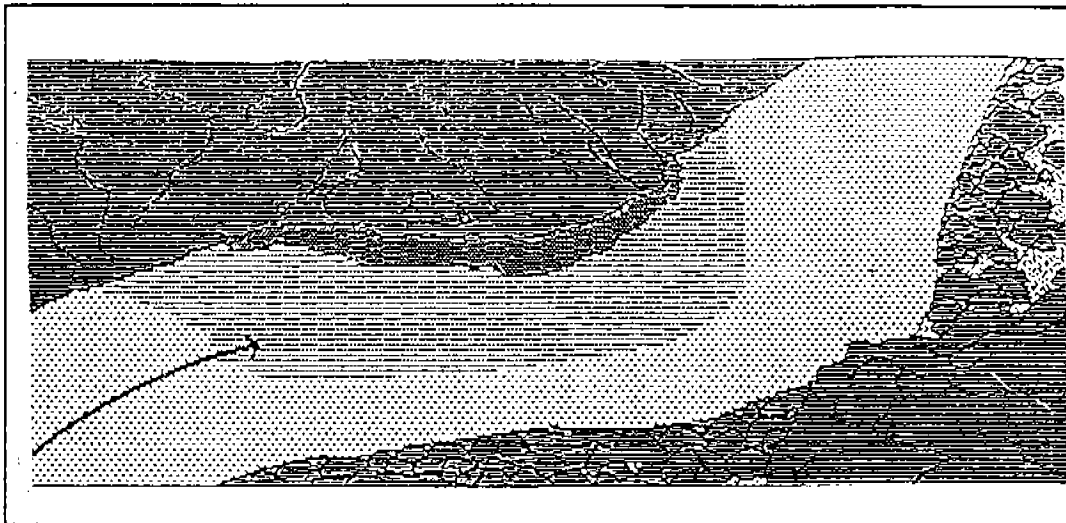
LATERAL SCOUR POOL ROOT WAD ENHANCED (LSR) [5.3] {11}



Formed by flow impinging against a partial channel obstruction consisting of a root wad. The associated scour is generally confined to < 60% of the wetted channel width.

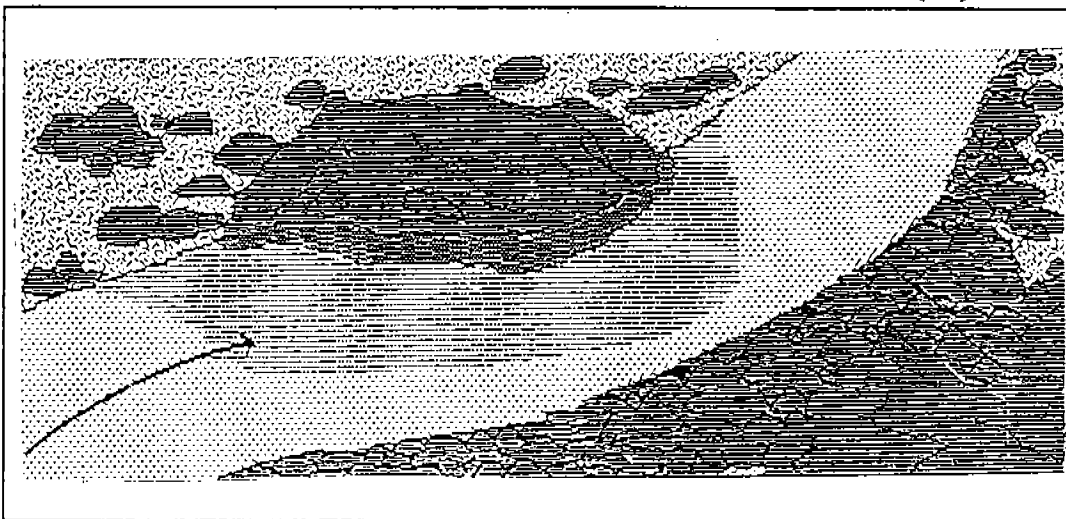
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

LATERAL SCOUR POOL - BEDROCK FORMED (LSBk) [5.4] {12}



Formed by flow impinging against a bedrock stream bank. The associated scour is generally confined to < 60% of the wetted channel width.

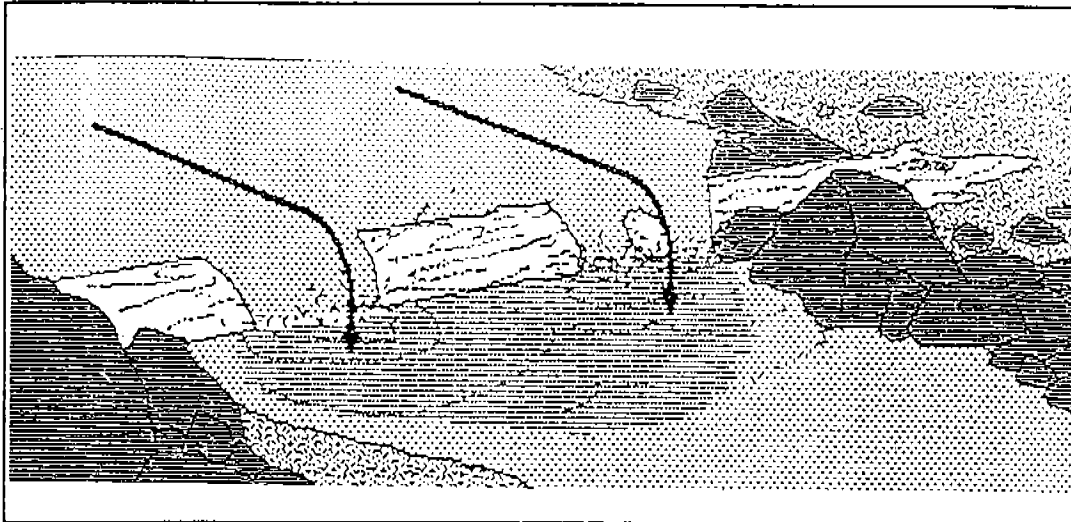
LATERAL SCOUR POOL - BOULDER FORMED (LSBo) [5.5] {20}



Formed by flow impinging against a partial channel obstruction consisting of a boulder. The associated scour is generally confined to < 60% of the wetted channel width.

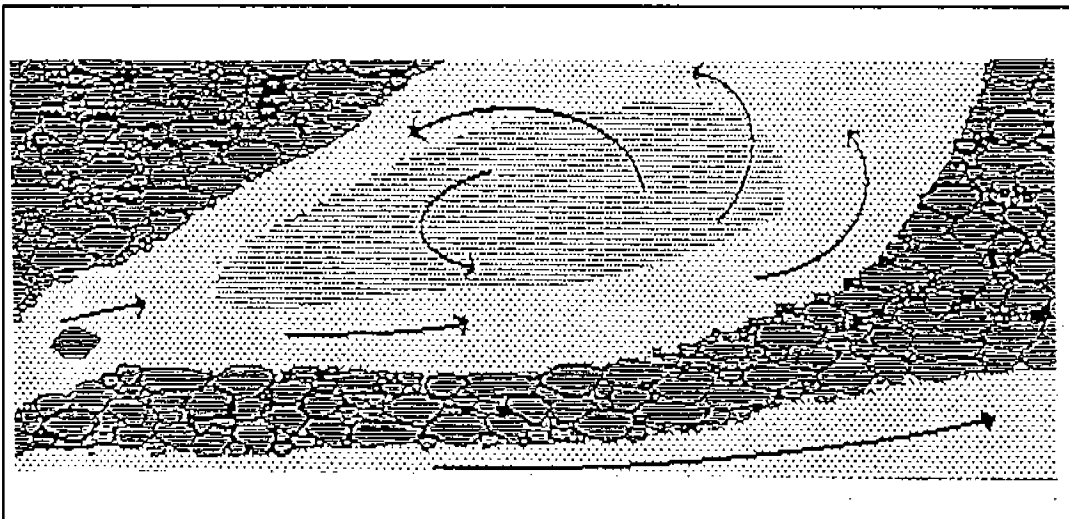
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

PLUNGE POOL (PLP) [5.6] {9}



Found where the stream passes over a complete or nearly complete channel obstruction and drops steeply into the streambed below, scouring out a depression; often large and deep. Substrate size is highly variable.

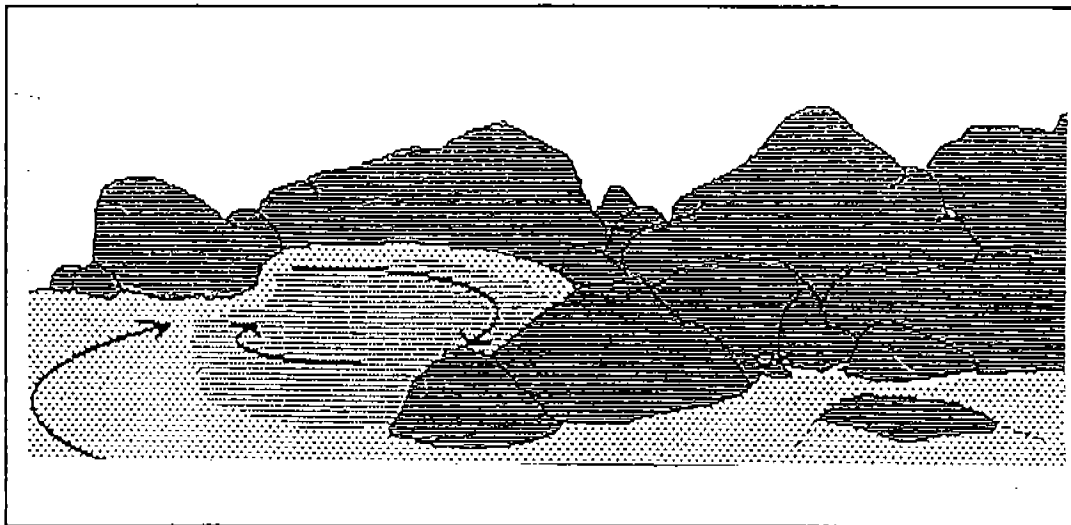
SECONDARY CHANNEL POOL (SCP) [6.1] {4}



Pools formed outside of the average wetted channel width. During summer, these pools will dry up or have very little flow. Mainly associated with gravel bars and may contain sand and silt substrate.

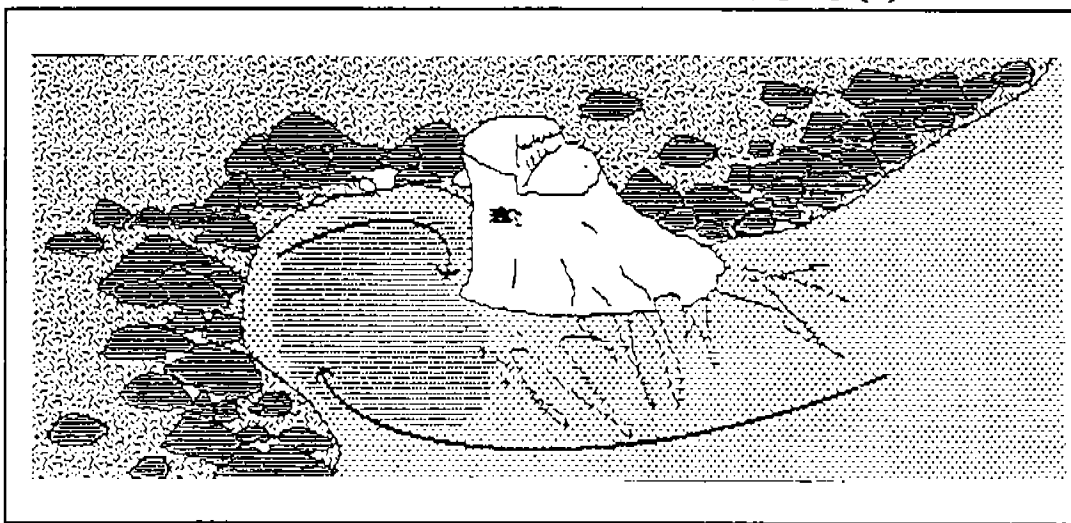
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

BACKWATERPOOL - BOULDER FORMED (BPB) [6.2] {5}



Found along channel margins and caused by eddies around a boulder obstruction. These pools are usually shallow and are dominated by fine-grain substrate. Current velocities are quite low.

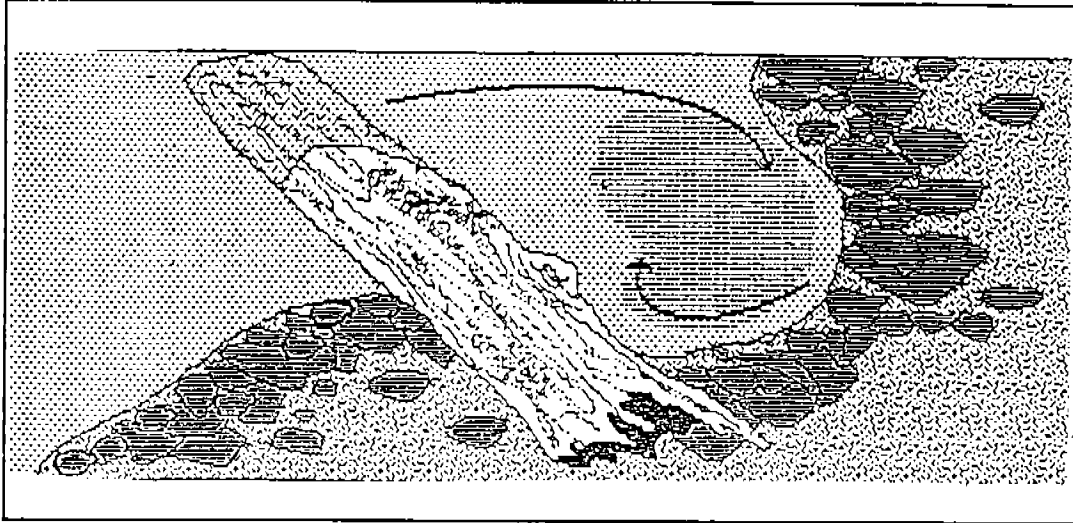
BACKWATERPOOL - ROOT WAD FORMED (BPR) [6.3] {6}



Found along channel margins and caused by eddies around a root wad obstruction. These pools are usually shallow and are dominated by fine-grained substrate. Current velocities are quite low.

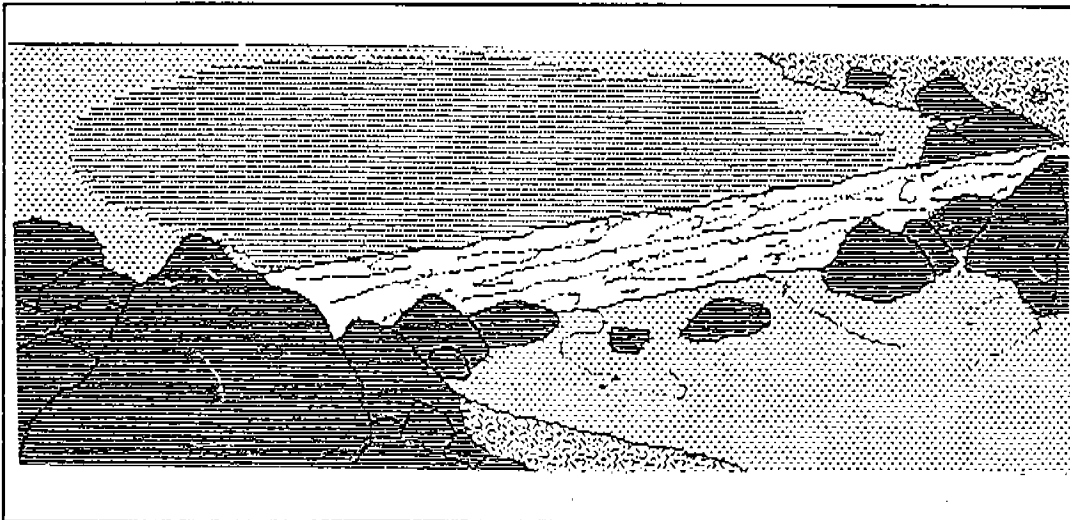
CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

BACKWATERPOOL - LOG FORMED (BPL) [6.4] {7}



Found along channel margins and caused by eddies around a large woody debris obstruction. These pools are usually shallow and are dominated by fine-grained substrate. Current velocities are quite low.

DAMMED POOLS (DPL) [6.5] {13}



Water impounded from a complete or nearly complete channel blockage (debris jams, rock landslides or beaver dams). Substrate tends to be dominated by smaller gravel and sand.

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

Instream Shelter

Instream shelter within each habitat unit can be rated according to a standard system. This rating system is a field procedure for habitat inventories which utilizes objective field measurements. It is intended to rate, for each habitat unit, complexity of shelter that serves as instream cover or that creates areas of diverse velocities which are focal points for salmonids. In this rating system, instream shelter is composed of those elements within a stream channel that provide protection from predation for salmonids, areas of reduced water velocities in which fish can rest and conserve energy, and separation between territorial units to reduce density related competition. This rating does not consider factors related to changes in discharge, such as water depth.

Instream Shelter Complexity. A value rating can be assigned to instream shelter complexity. This rating is a relative measure of the quantity and composition of the instream shelter.

Value Instream Shelter Complexity Value Examples:

- | | |
|---|--|
| 0 | <ul style="list-style-type: none">● No shelter. |
| 1 | <ul style="list-style-type: none">● One to five boulders.● Bare undercut bank or bedrock ledge.● Single piece of large wood (> 12" diameter and 6' long) defined as large woody debris (LWD). |
| 2 | <ul style="list-style-type: none">● One or two pieces of (LWD) associated with any amount of small wood (< 12" diameter) defined as small woody debris (SWD).● Six or more boulders per 50 feet.● Stable undercut bank lacking root mass.● A single root wad lacking complexity.● Branches in or near the water.● Limited submersed vegetative fish cover.● Bubble curtain. |
| 3 | <p>Combinations of:</p> <ul style="list-style-type: none">● LWD/boulders/root wads.● Three or more pieces of LWD combined with SWD.● Three or more boulders combined with LWD/SWD.● Bubble curtain combined with LWD or boulders.● Stable undercut bank with greater than 12" undercut, associated with root mass or LWD.● Extensive submersed vegetative fish cover. |

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

Instream Shelter Percent Cover. Instream shelter percent cover is a measure of the area, of a habitat unit, occupied by instream shelter. The area is estimated from an overhead view.

Instructions for Completing The Habitat Inventory Data Form

- 1) **Form No.** - Print in the form number. Number the forms sequentially beginning with "01" on the first page and "02" on the second and so on.
- 2) **Date** - Enter the day's date: mm/dd/yy.
- 3) **Stream Name** - Print in the stream name.
- 4) **Legal** - Enter the township, range and section of the stream confluence or from where you started the survey from the USGS quadrangle.
- 5) **Lat** - Enter the latitude taken from the 7.5-minute USGS quadrangle at the confluence of the stream (see Page II-2).
- 6) **Long** - Enter the longitude taken from the 7.5-minute USGS quadrangle at the confluence of the stream (see Page II-2).
- 7) **Quad** - Enter the name of the 7.5-minute USGS quadrangle on which the confluence of the stream appears.
- 8) **Surveyors** - Enter the names of the surveyors.
- 9) **Flow Measurement** - Record the volume at the time of the survey. Record in cubic feet/second.
- 10) **Channel Type** - Record the channel type determined from completing the Stream Channel Type Worksheet. (see Page III-26)
- 11) **Reach** - Enter the reach number beginning with 1 for the lowermost channel type in the basin. Each stream channel type change proceeding upstream will be designated by a new stream reach number.
- 12) **Time** - At the beginning of each page enter the time in military time (24-hour clock).

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

- 13) **Water Temperature** - At the beginning of each page record the water temperature to the nearest degree Fahrenheit. Water temperatures are taken in the middle of the habitat unit, within one foot of the water surface.
- 14) **Air Temperature** - At the beginning of each page record the air temperature to the nearest degree Fahrenheit. Air temperatures are taken in the middle of the habitat unit.
- 15) **Habitat Unit Number** - Enter the habitat unit number. These numbers are in sequential order, beginning with "001" at the mouth of the stream. When numbering side channels begin with the number of the unit where the split or divide begins, use a new column and entirely fill it out for each adjacent unit, and number it sequentially adding a ".1" or ".2" as appropriate to describe the exact position of units. See the example:

Habitat Unit Number	5	6	6.1	6.2	7
Habitat Unit Type	5.3	1.1			4.2
Side Channel Type			1.1	3.2	

- 16) **Habitat Unit Type** - Determine the type of habitat unit and enter the appropriate habitat type number code. If the unit is dry, use 7.0 for the habitat type number code.
- 17) **Side Channel Type** - Determine the type of habitat unit and enter the appropriate habitat type number code.
- 18) **Mean Length** - Enter the thalweg length of the habitat unit, in feet.
- 19) **Mean Width** - Measure two or more channel widths within the habitat unit. Calculate and enter the mean width for the habitat unit, in feet.
- 20) **Mean Depth** - Take several random depth measurements across the unit with a stadia rod. Calculate and enter the mean depth, in feet.
- 21) **Maximum Depth** - Enter the measured maximum depth for each habitat unit, in feet.
- 22) **Depth Pool Tail Crest** - Measure the maximum thalweg depth at the pool tail crest, in feet. This measurement is taken only in pool habitat units and is used to determine the pool's residual volume.

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

- 23) **Pool Tail Embeddedness** - In the pool tails enter the number code for the percent to which the cobbles are surrounded or covered by fines:

1 = 0 to 25 %
2 = 26 to 50 %
3 = 51 to 75 %
4 = 76 to 100 %

- 24) **Shelter Value** - Enter the number code (0 to 3) that corresponds to the dominant structural shelter type that exists in the unit (Page III-43)
- 25) **Percent Unit Covered** - Enter the percentage of the unit occupied by the dominant structural shelter. Classify 100 percent of the cover by the types indicated on the form. Note: bubble curtain includes white water.
- 26) **Substrate Composition** - Enter a "1" for the dominant substrate and a "2" for the co-dominant substrate. Note: changes in the dominant and co-dominant substrate may indicate that the channel type has changed.
- 27) **Percent Exposed Substrate** - Enter the estimated percentage of the bottom substrate of the unit that is exposed above the water surface.
- 28) **Percent Total Canopy** - Enter the percentage of the stream area that is influenced by the tree canopy. The canopy is measured using a spherical densiometer at the center of each habitat unit (Appendix M).
- 29) **Percent Deciduous Trees** - Of the percent total canopy estimate the percent of the canopy consisting of deciduous trees.
- 30) **Percent Coniferous Trees** - Of the percent total canopy estimate the percent of the canopy consisting of coniferous trees.
- 31) **Right Bank Composition** - Observed from the water to bankfull discharge level. Enter the number (1 through 4) for the right bank composition type corresponding to the list located on the lower left hand side of the form. Enter one number only. The right bank is the right side of the stream when facing downstream.
- 32) **Right Bank Dominant Vegetation** - Enter the number (5 through 9) for the right bank dominant vegetation type corresponding to the list located on the lower left hand side of the form. Enter one number only.
- 33) **Percent Right Bank Vegetated** - Estimate the total percentage of the right bank covered with vegetation from bankfull discharge level to 20 feet upslope.

CALIFORNIA SALMONID STREAM HABITAT RESTORATION MANUAL

- 34) **Left Bank Composition** - Observed from the water to bankfull discharge level. Enter the number (1 through 4) for the left bank composition type corresponding to the list located on the lower left hand side of the form. Enter one number only. The left bank is the left side of the stream when facing downstream.
- 35) **Left Bank Dominant Vegetation** - Enter the number (5 through 9) for the left bank dominant composition type corresponding to the list located on the lower left hand side of the form. Enter one number only.
- 36) **Percent Left Bank Vegetated** - Estimate the total percentage of the left bank covered with vegetation from bankfull discharge level to 20 feet upslope.
- 37) **Comments** - Add comments that are important to that habitat unit such as: 1) the location of tributaries, bridges, culverts, or diversions; 2) the presence of landslides, or barriers; or 3) a change in channel type, etc.

HABITAT INVENTORY DATA FORM

Form # ____ of ____

Date ____/____/____ Stream Name _____ T ____ R ____ S ____

Lat. _____ Long. _____ Quad. _____

Surveyors _____ Flow _____

Channel Type _____ Reach # _____ Time _____ Water Temp _____ Air Temp _____

Habitat Unit Number.....

Habitat Unit Type.....

Side Channel Type.....

Mean Length.....

Mean Width.....

Mean Depth.....

Maximum Depth.....

Depth Pool Tail Crest...

Pool Tail Embeddedness..

SHELTER RATING

Shelter Value.....

% Unit Covered.....

% undercut bank.....

% swd (d<12").....

% lwd (d>12").....

% root mass.....

% terr. vegetation..

% aqua. vegetation..

% bubble curtain....

% boulders (d>10")..

% bedrock ledges....

SUBSTRATE COMPOSITION (Select two most dominant compositions)

Silt/Clay.....

Sand (<0.08")...

Gravel (0.08-2.5")...

Sm Cobble (2.5-5")...

Lg Cobble (5-10")...

Boulder (>10")...

Bedrock.....

% Exposed Substrate.....

PERCENT TOTAL CANOPY....

% Deciduous Trees.....

% Coniferous Trees.....

BANK COMPOSITION & VEGETATION (See bank and vegetation types below)

Rt Bk Composition.....

Rt Bk Dominant Veg.....

% Rt Bk Vegetated.....

Lft Bk Composition.....

Lft Bk Dominant Veg

% Lft Bk Vegetated.....

***** COMMENTS *****

BANK COMPOSITION TYPE

1) Bedrock

2) Boulder

3) Cobble/Gravel

4) Silt/Clay/Sand

VEGETATION TYPES

5) Grass

6) Brush

7) Deciduous Trees

8) Coniferous Trees

9) No Vegetation

Appendix E.

USGS gauge stations in the Santa Margarita River, San Mateo Creek
and San Onofre Creek drainages and monthly surface flow
totals (acre-feet) for the period of record at gauge
station 11046000, 11046300, and 11046310.



USGS gauge stations, drainage area, county and periods of record for the Santa Margarita River, and San Mateo, Cristianitos, San Onofre and Las Flores creeks.

Station #	Station Name	Drainage Area (mi) ²	County	Hydrologic Unit Code	Basin Name	Periods of record
11042800	Warm Springs Cr. Nr Murrieta CA	55.40	Riverside	18070302	Santa Margarita	1987-91, 1992-93
11042900	Santa Gertrudis Cr. Nr Temecula CA	90.16	Riverside	18070302	Santa Margarita	1987-91, 1992-1993
11043000	Murrieta Cr. at Temecula CA	222.00	Riverside	18070302	Santa Margarita	1930-95
Notes: The Warm springs Cr.: Channel was lined by Rancho California Water District in 1991. The water district can discharge into the creek from an automated pump, approximately 0.1 mi upstream from station. Santa Gertrudis Cr: Flow partly regulated by skinner Reservoir. Flow less than 1 cfs from local landscape-irrigation runoff at times bypasses station. Murrieta Cr: Since 1974, flow partly regulated by skinner Reservoir. Rancho California Water District can discharge into creek, approximately 0.1 mi upstream, to supplement low flow. Varying amounts of backwater caused by beaver dams during low flow periods.						
11042600	Temecula Cr. Below Vail Dam	N/A	Riverside	18070302	Santa Margarita	1977-78
11042631	Pechanga Cr. near Temecula	13.80	Riverside	18070302	Santa Margarita	1987-93
11044000	Santa Margarita R. near Temecula	588.00	Riverside	18070302	Santa Margarita	1923-95
Notes: Construction of Vail Dam completed in 1949. There had been no spill from November 1948 to February 1980, when a 8,000 cfs peak spill occurred. Water is currently released down Temecula Cr. for diversion approximately 1 mi. downstream. Pechanga Cr: No water regulation or diversions upstream from gage station. No flow for many days each year. Flows at gage station 11044000 have been partly regulated since November 1948 by Vail Lake, and since 1974 by Skinner Reservoir. Rancho California Water District can discharge into Murrieta Cr. approximately 0.1 mi upstream, to supplement flow.						
11044250	Rainbow Cr. near Fallbrook	10.30	San Diego	18070302	Santa Margarita	1989-93
11044300	Santa Margarita River at Fallbrook public utility district sump, near fallbrook.	620.00	San Diego	18070302	Santa Margarita	1989-93
11044350	Sandia Cr. near Fallbrook	21.10	San Diego	18070302	Santa Margarita	1989-93
11044800	De Luz Cr. near De Luz	33.03	San Diego	18070302	Santa Margarita	1992-93
Notes: Rainbow Cr.: No regulation upstream from station. Undetermined amount of water upstream from station used for irrigation by a local nursery. Water is imported for domestic use and irrigation. Flow at the Fallbrook Public Utility District sump has been partly regulated. since November 1948 by Vail Lake and since 1974 by w Skinner Reservoir. Sandia Cr.: No regulation or diversions upstream of stations. Also poor flow records. Deluz Cr: No regulation or diversion upstream from station.						
11044500	Santa Margarita R. near Fallbrook	644.00	San Diego	18070302	Santa Margarita	1924-80
11044600	Santa Margarita R. Trib near Fallbrook	0.52	San Diego	18070302	Santa Margarita	1961-65
11044900	De Luz Cr. near Fallbrook CA	47.50	San Diego	18070302	Santa Margarita	1951-67, 1989-90
11045000	Santa Margarita R near De Luz Sta. CA	705.00	San Diego	18070302	Santa Margarita	1924-26
11046000	Santa Margarita R A Ysidora CA	740.00	San Diego	18070302	Santa Margarita	1923-26, 1930-93
11042430	Coahuila Cr. Trib at Anza CA	4.90	Riverside	18070302	Santa Margarita	N/A
11045300	Fallbrook Cr. near Fallbrook CA	6.97	San Diego	18070302	Santa Margarita	N/A
11046050	Santa Margarita R. at Mo near Oceanside CA	744.00	San Diego	18070302	Santa Margarita	N/A
11046100	Las Flores Cr. near Oceanside CA.	26.60	San Diego	18070301	Aliso-San Onofre	1951-67, 1969-79
11046200	San Onofre Cr. near San Onofre CA.	34.60	San Diego	18070301	Aliso-San Onofre	1950-67
11046250	San Onofre Cr. at San Onofre CA.	42.23	San Diego	18070301	Aliso-San Onofre	1946-67, 1989-89
11046300	San Mateo Cr. at San Clemente CA.	80.00	San Diego	18070301	Aliso-San Onofre	1952-96
Note: USGS records to 1967, Camp Pendleton has records 1967-1996						
11046310	San Mateo Cr. near San Onofre CA.	91.90	San Diego	18070301	Aliso-San Onofre	1950-52
11046350	Critianitos Cr. near San Clemente CA.	29.00	San Diego	18070301	Aliso-San Onofre	1950-67
11046370	San Mateo Cr. at San Onofre CA.	132.00	San Diego	18070301	Aliso-San Onofre	1946-67, 1983-85
Note: Camp Pendleton has good records 1947-1976						

SMR at Yisodora Gauge Station 11046000 (Total acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Year Total
1923						944	88	8	0	0	0	0	
1924	0	0	437	603	235	532	540	19	0	0	0	0	2,366
1925	0	0	165	396	74	73	79	5	0	0	0	0	792
1926	0	0	19	10	1,143	209	14,253	149	22	0	0	0	15,804
1931	5	36	58	236	2,472	469	201	122	44	8	8	3	3,662
1932	24	75	2,823	1,892	31,333	3,590	487	332	99	26	18	28	40,725
1933	98	92	613	2,787	1,584	629	310	176	69	63	58	68	6,548
1934	87	77	368	3,174	526	430	140	76	70	32	24	24	5,028
1935	51	95	995	1,954	3,674	3,984	1,236	302	301	166	142	137	13,035
1936	137	145	154	157	7,376	1,063	1,152	262	248	194	111	94	11,093
1937	141	143	5,766	8,199	55,835	36,122	8,517	2,132	673	28	24	0	117,583
1938	40	42	686	1,093	5,248	106,714	5,357	2,688	512	30	0	0	122,408
1939	0	158	4,445	3,725	7,823	3,552	1,984	479	3	0	0	806	22,976
1940	299	444	640	7,031	9,552	1,928	2,143	343	0	0	0	0	22,380
1941	0	0	8,703	2,724	16,977	53,746	27,743	6,201	1,713	156	5	0	117,968
1942	819	1,313	3,013	3,524	2,533	3,021	2,058	630	84	0	0	0	16,995
1943	0	37	543	32,807	13,347	22,246	4,310	1,064	166	0	0	0	74,521
1944	0	0	3,291	1,753	14,306	6,450	1,461	469	151	0	0	0	27,880
1945	0	3,930	1,065	1,047	2,872	8,818	2,159	398	56	0	0	0	20,344
1946	0	0	4,052	1,104	1,043	2,594	2,730	155	0	35	0	0	11,713
1947	0	1,327	2,202	1,520	949	707	243	4	0	0	0	0	6,953
1948	0	0	0	0	203	176	185	0	0	0	0	0	564
1949	0	0	0	0	171	309	0	0	0	0	0	0	481
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	21,528	797	21,353	3,678	435	0	0	0	0	47,790
1953	0	0	0	0	7	2	0	0	0	0	0	0	9
1954	0	0	0	0	3,291	2,808	1,292	30	0	0	0	0	7,422
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	7,679	22,613	180	1	0	0	0	30,473
1959	0	0	0	0	0	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	2,490	2,390	0	716	93	24	9	0	0	0	0	5,722
1967	0	0	4,421	0	1,365	625	919	125	14	4	0	0	7,475
1968	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	21,747	80,165	11,357	3,013	705	91	31	22	18	117,149
1970	14	14	15	0	18	4,513	47	12	8	5	0	0	4,644
1971	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	3,051	3,390	424	57	25	4	0	0	6,951
1974	0	0	0	0	122	349	27	0	0	0	0	0	498
1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	46,194	41,478	66,048	2,659	1,017	268	1	0	0	157,664
1979	0	0	1,670	14,931	14,374	10,561	6,358	1,749	722	193	0	0	50,558
1980	0	0	0	25,827	129,770	37,313	9,164	3,252	123	105	49	40	205,642
1981	742	716	1,618	1,351	1,622	3,114	1,274	839	193	0	0	0	11,470
1982	0	205	580	5,104	3,425	13,190	4,476	1,301	718	372	0	0	29,372
1983	138	2,929	3,762	6,177	12,030	49,179	12,032	5,494	1,777	598	1,947	252	96,314
1984	2,424	3,699	7,620	2,163	1,232	746	248	98	0	0	0	0	18,230
1985	0	0	3,962	1,479	2,263	1,445	864	393	0	0	0	0	10,405
1986	0	2,233	1,256	328	5,251	11,331	1,926	725	658	59	0	298	24,067
1987	402	1,017	1,075	1,538	1,017	237	255	116	6	0	0	0	5,664
1988	303	2,079	2,189	2,622	892	665	643	440	42	0	0	0	9,875
1989	0	89	1,033	662	461	373	288	258	174	0	0	0	3,337
1990	0	292	1	444	949	358	527	347	381	51	0	0	3,351
1991	0	86	352	293	949	30,807	2,380	768	435	246	134	170	36,619
1992	101	121	741	3,347	11,466	11,236	3,777	1,435	717	360	194	91	33,587
1993	365	175	2,787	139,505	72,193	15,220	7,035	4,290	1,843	566	502	310	244,791
1994	1,110	527	722	985	7,162	4,366	2,155	1,323	501	161	0	0	19,012
1995	0	73	549	42,570	19,954	55,268	8,125	3,884	1,883	595	279	213	133,394
1996	118	235	641	765	4,129	3,910	753	259	54	0	0	0	10,865
Median 1923-1926	0	0	165	396	235	209	540	19	0	0	0	0	
Median 1930-1996	0	0	263	553	1,030	904	507	166	7	0	0	0	
Median Period of Record	0	0	165	444	1,017	707	527	149	6	0	0	0	

San Mateo Creek													Year Total
Gauge 11046300 "Upper Gage" (Acre-feet)													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	
1947													
1948													
1949													
1950													
1951													
1952													
1953	0	78	347	530	177	223	151	73	16	0	0	0	1,595
1954	0	0	0	2,500	1,340	2,350	1,070	301	75	2	0	0	7,638
1955	0	2	23	631	234	282	81	95	8	0	0	0	1,356
1956	0	0	4	2,390	262	131	158	61	5	0	0	0	3,011
1957	0	0	0	95	120	251	98	65	8	0	0	0	637
1958	0	0	59	186	3,070	7,890	16,070	1,140	259	50	2	0	28,726
1959	0	11	19	79	825	136	61	23	1	0	0	0	1,155
1960	0	0	3	205	429	224	168	18	0	0	0	0	1,047
1961	0	0	0	6	5	2	0	0	0	0	0	0	13
1962	0	0	44	408	1,930	1,210	343	128	33	0	0	0	4,096
1963	0	0	0	0	321	96	57	20	5	0	0	0	499
1964	0	2	0	68	26	137	95	16	0	0	0	0	344
1965	0	0	0	1	6	13	1,060	20	0	0	0	0	1,100
1966	0	4,130	2,860	2,280	964	486	199	54	0	0	0	0	10,973
1967	0	0	10,100	2,060	1,100	680	1,440	909	331	94	0	0	16,714
1968	0	286	423	153	166	361	139	68	6	0	0	0	1,602
1969	0	0	5	9,483	31,415	7,799	2,326	1,088	592	231	80	74	53,093
1970	75	124	123	193	219	1,596	195	92	48	15	0	0	2,680
1971	0	45	754	378	179	111	78	58	25	0	0	0	1,628
1972	0	5	99	149	90	49	17	0	0	0	0	0	409
1973	0	16	70	592	2,248	3,381	723	167	23	0	0	0	7,220
1974	0	0	0	1,438	67	978	167	48	1	0	0	0	2,699
1975	0	0	14	10	117	828	1,144	216	58	0	0	0	2,387
1976	0	0	0	2	226	285	61	10	0	0	0	0	584
1977	0	0	0										0
1978													0
1979													0
1980													0
1981													0
1982													0
1983													0
1984													0
1985													0
1986													0
1987													0
1988													0
1989													0
1990				61	250	72	64	89	21				557
1991	0	0	0	0	81	3,916	161	6	0				4,164
1992	0	0	0	4	3,231	4,562	2,401	1,618	0				11,816
1993	0	0	1,052	32,226	19,642	6,300	2,051	833	358	129	62	46	62,699
1994	32	63	145	151	1,590	717	289	181	47	0	0	0	3,215
1995	0	4	17	8,080	5,530	22,810	3,670	1,580	772	295	79	38	42,875
1996	64	100	119	221	1,070	812	298	64	12	0	0	0	2,760
Median 1953-1976	0	0	14	199	230	284	163	63	7	0	0	0	
Median 1990-1996	0	2	68	151	1,590	3,916	298	181	21	65	31	19	

San Mateo Creek													
Gauge 11046310 "Lower Gage" (Acre-feet)													
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Year Total
1947	6	6	6	6	6	6	6	6	2	0	0	0	50
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	0	0	0	0	0	0	0	0	0	0	0	0
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	7,860	369	11,480	2,610	560	2	0	0	0	22,881
1953	0	113	366	449	52	42	9	0	0	0	0	0	1,031
1954	0	0	0	2,050	814	1,330	460	13	0	0	0	0	4,667
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	1,320	0	0	0	0	0	0	0	0	1,320
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	4	508	6,020	18,090	399	123	2	0	0	25,147
1959	0	0	8	2	402	19	12	14	13	12	10	15	508
1960	8	4	0	0	0	0	0	0	0	0	0	0	12
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	2,800	50	0	0	0	0	0	0	2,850
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	2,645	1,880	1,350	306	93	9	0	0	0	0	0	6,283
1967	0	0	12,540	2,420	1,040	529	1,960	705	184	72	0	0	19,451
1968	0	195	238	42	6	339	14	6	0	0	0	0	840
1969	0	0	0	14,837	45,797	13,487	3,019	1,153	395	94	51	37	78,870
1970	33	27	12	18	23	0	0	0	0	0	0	0	113
1971	42	38	494	95	36	51	56	38	64	76	74	61	1,125
1972	48	58	207	72	69	60	52	46	47	40	40	38	777
1973	40	36	36	232	1,499	2,747	362	87	70	76	72	59	5,316
1974	54	54	53	547	70	319	88	78	57	61	53	46	1,480
1975	51	50	95	50	53	665	1,108	88	78	70	62	55	2,425
1976	28	27	28	30	42	44	38	33	31	31	26	22	380
1977													
1978													
1979													
1980													
1981													
1982													
1983													
1984													
1985													
1986													
1987													
1988													
1989													
1990													
1991													
1992													
1993													
1994													
1995													
1996													
Median 1947-1976	0	0	0	12	30	31	7	0	0	0	0	0	
Median 1953-1976	0	0	4	36	47	47	11	3	0	0	0	0	

Appendix F.

Macroinvertebrate Data and Map of Sampling Sites.



Appendix F. Summary of macroinvertebrate taxa collected during the spring of 1997.

		Santa Margarita River						Roblar Cree	San Onofre Cree		San Mateo Creek				
Feeding Guild		2 98	3 9	4 10	5 52	6 253	7 369	1 429	1 3006	2 267	1 2788	2 2610	3 542	4 281	6 143
DIPTERA															
Tipulidae	SH	33	1	2	3	6		25	7	3	124	89	1		
Simuliidae	F	19	4	1	16	20	33	24	117	26	586	175	26		
Psychodidae	CG											38			
Chironomidae		8			3	29	73	62	358	139	754	312	23	10	8
Chironomidae	CG				1	12	7	24		55	392	104	9	2	3
All others	CG	8			2	17	66	38	358	84	362	208	14	8	5
Ceratopogonidae	P							5	50						
Stratiomyidae	CG				2	2				1	1		7	2	
Syrphidae	CG							1		1					
Ephydriidae	CG							33	85	5	30		11	4	
Muscidae	P		1	1		1	2								1
Ephemeroptera															
Baetidae	SC	13	2	4	19	119	163	138	1630	13	891	1241	166	131	58
Caenidae	SC	4	1			45	35	19	144		266	635	69	30	9
Leptophlebiidae	SH								83					1	
Siphonuridae	C	1										8		1	
Odonata															
Coenagrionidae	P						2	11		3	7			5	5
Calopterygidae	P					5	1	3							
Libellulidae	P						2		2		3				
Aeshnidae	P							3	3	6	1				
Gomphidae	P				4	2	4	7	4	3	1		1	3	2
Plecoptera															
Amphinemuridae	SH				1							3	34	2	3
Perlidae	P							5				4	24	14	4
Nemouridae	SH							21				1	30		
Tricoptera															
Hydropsychidae	F	12				7	10	33			1	1	41	22	8
Hydroptilidae	CG	2					5	5					26	23	7
Philopotamidae	F					3	4							14	3
Polycentropoidae	P						1						3		
Psychomyiidae	SC					1	3								
Rhyacophilidae	P	4				4		3							
Philymniidae	F	1													
Brachycentridae	O														
Lepidostomtidae	SH					2							43		
Lepidoptera															
Pyrallidae	SC						23								
Megaloptera															
Corydalidae	P				1			3		2	3	11	4	2	
Coleoptera															
Dryopidae							1	14	35	22	26	9	5		4
larvae	SH							6	27	15	26	8			
adults	SC						1	8	8	7		1	5		4
Elmidae	CG					1	2	3	338	10	30	2		1	1
Gyrinidae	P								23		17	2	5		
Psephenidae	SC						3		15			3			
Dytiscidae	P						2	9	26	10	43	12	15	14	17
Haliplidae	SC								15	22		34		2	9
Hydrophilidae									69		4	30	6		1
larvae	P								35						
adults	CG								34		4	30	6		1
Hemiptera															
Gerridae	P												2		1
Belostomatidae	P					5		1	2	1					1
Salidae	P			2											
Corixidae	P	1				1		1							1
Naucoridae	P				3										

Page 1 of 2

Air Temp. 70°F

130000 1/5 of T

[illegible]

$TDS = \text{Total Dissolved Solids}$

A. J. Highway 5 100 yds. 5:00 pm (1700)

c. pH could not get to stabilize using OA/700

12

Map additional comments

Lall.

Long.

Map drawing marked on airphoto

Insects Collected

GPS Reading

GPS @ Beach with BM 26

mouth is open
water level is low - tide is out
mullet seen in shallows

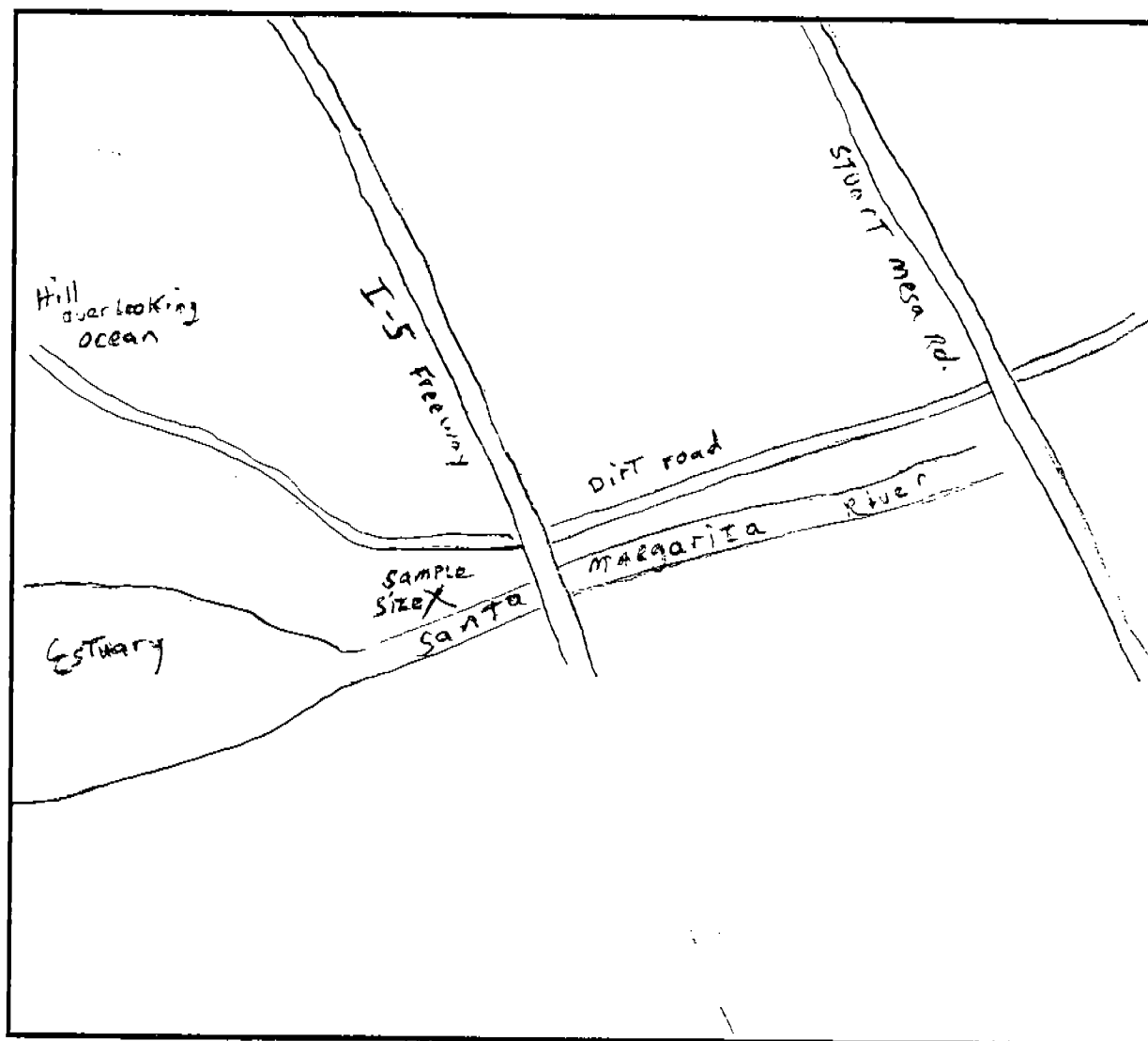
Hand Map of Stream location

Date 3-17-97

Author of Map MC

2/2

Field Crew MC, BO, RK



SMR 1

Going North on STUART mesa Rd. Take first dirt road to left after crossing the Santa margarita River. The sampling location (water quality only) was 100 yards downstream of the I-5 bridge

~~SMR-2~~
SMR-2

Water Quality - Field Data Collection Sheet

Date 3/20/97 Time 8:45
Collector(s) RK, MC
Stream Salt Lake River

Weather Clear Sunny
Air Temp. 27.0° F
Reach SMR-2

Page 1 of 4

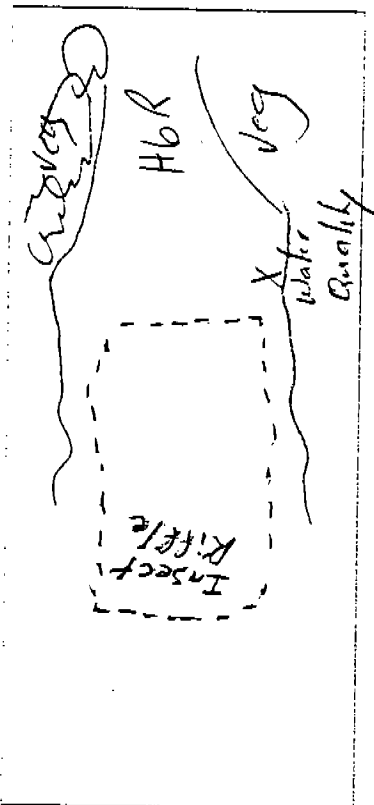
TDS = Total dissolved solid

SITE	TEMP.	DEPTH	pH	TIME	ppm D.O.	mg/l NO ₃	mg/l NH ₄	PO ₄	COND.	g/L TDS	% SALINITY
A	14°C	1.50m	7.3	8:45	10.6	2.1	0.3		1.31 X 10	.65	
B		n/m									
C		n/m									
D		n/m									
		n/m									
		n/m									

Comments

A sample location is a recent (this year) formed side channel. The old main stem channel had standing water pools that were 3"-4" in depth. The bank right side of our sample location was heavily vegetated. Stewardman to mac to dirt road was route followed

Map of collection points



Utah
Salt Lake

0463436c
3677809n

Map drawing marked on airphoto

Insects Collected

GPS Reading

N 33° 14.319

W 117° 23.575

Elevation 221'

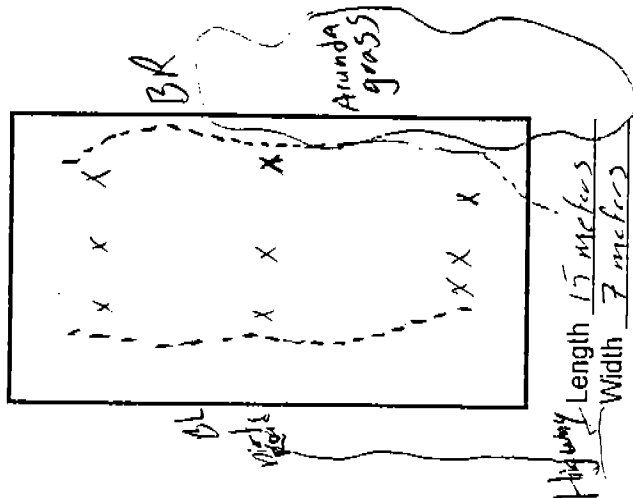
YES NO

YES NO

YES NO

SMP-2

Rifle Sample Locations



INSECT COLLECTION DATA FORM

Page 2 of 4

Weather Sunny, slight breeze out

Air Temp. ~ 70° East

Reach SMP 2

Depth 0.05'

Date/Time 3/20/97 400

Collector(s) RK, ML

Stream Santa Margarita River

Sample Number SMP 21.2, .3

County Sandoval

Township N33 14.319, Range W 117° 23.575
Section 221

Comments

Above a nice pool 4'-5' deep. 1/2 to 1/4 mile upstream from
the highway 50 meters of the dirt Road we came in on.

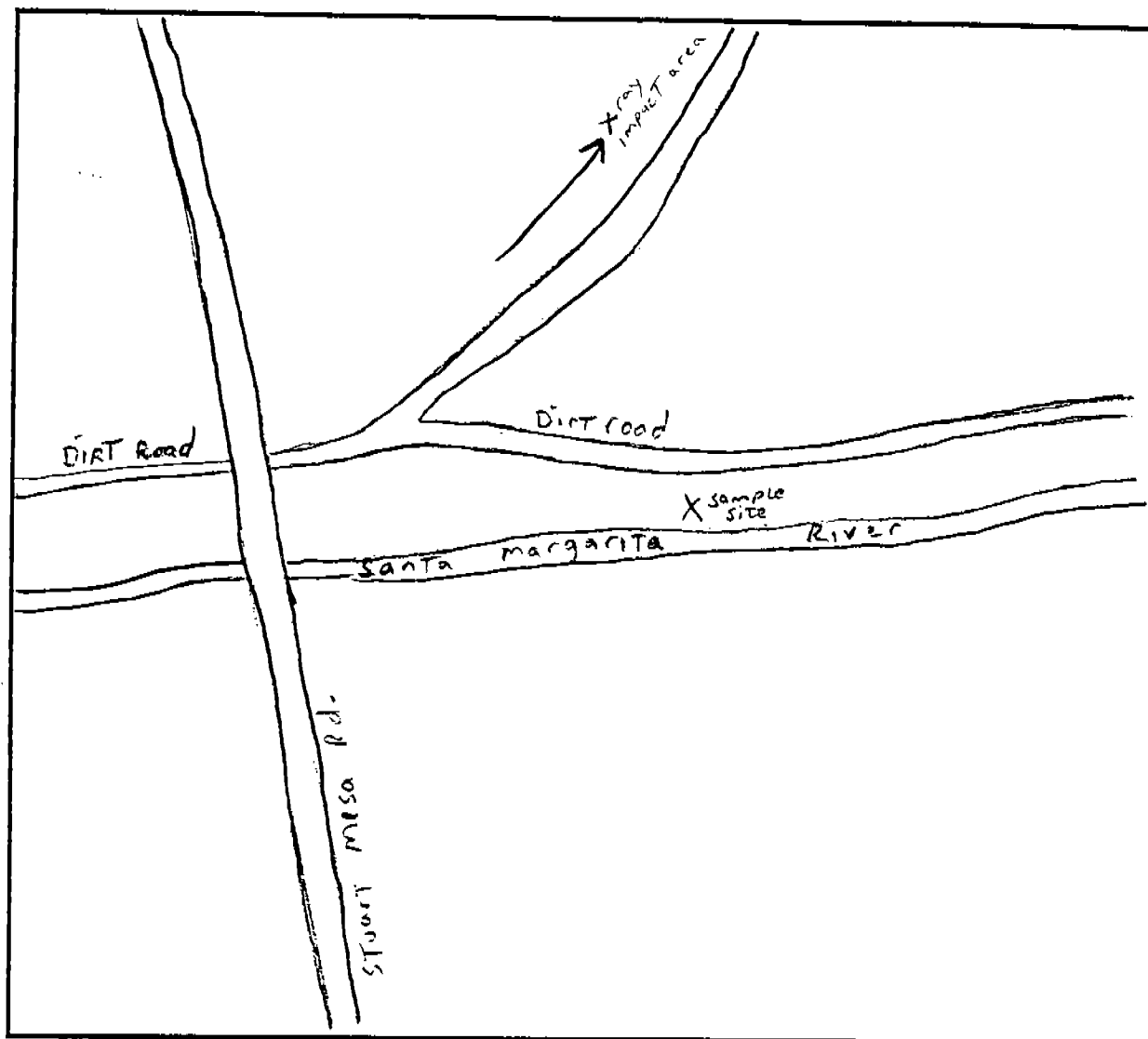
Hand Map of Stream location

Date 3-20-97

3/4

Author of Map MC

Field Crew MC, BO, RK



SMR2

Going North on STUART MESA RD. turn right on dirt road
AFTER crossing The Santa Margarita River. When the road
forks stay to the right and follow the dirt road along the river.
The water quality and insect sample site was a 1/4 upstream of
STUART MESA RD. mi

SMR-3

Water Quality - Field Data Collection Sheet

Date 3/27/97 Time 830

Weather OVERCAST

Page 1 of 4

Collector(s) RL, nlc

AirTemp. 36.0 °F

Stream Santa Margarita below airstrip

Reach SMR3

1 TDS = Total dissolved solid

SITE	TEMP	DEPTH	PH	TIME	DO	NO ₃	NO ₂	PO ₄	COND	g/L	TDS	SALINITY
A SMR3	18.0	4.0m	7.0	8:35	9.0	1.6	NEG	3	1.47	0.74	1811	
B		0.1m										
C		0.1m										
D		0.1m										
		0.1m										
		0.1m										

Comments

A. Clear water, no cobble rock substrate present. Sand as far as the eye can see. This location is adjacent to down stream a sewage treatment facility and related oxidation ponds. Rip rap lines the banks reinforced with 3"x3" x 12' wire boxes filled with cobble.

N 33° 17' 03.43
W 117° 22' 26.73

Map drawing marked on airphoto ☒ YES ☐ NO

Insects Collected ☒ YES ☐ NO

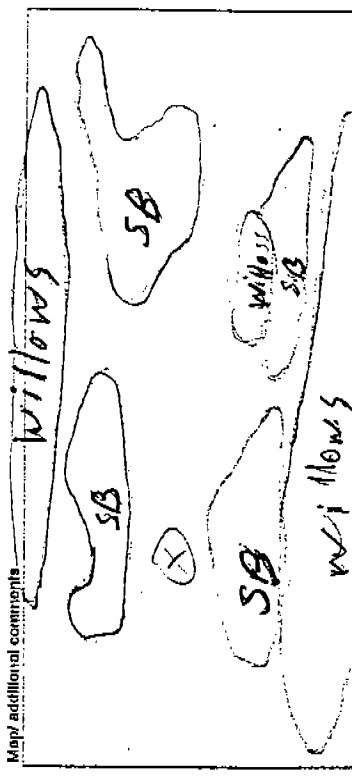
GPS Reading ☒ YES ☐ NO

04165173C

3682866N

Elevation 22 feet

Map/ additional comments

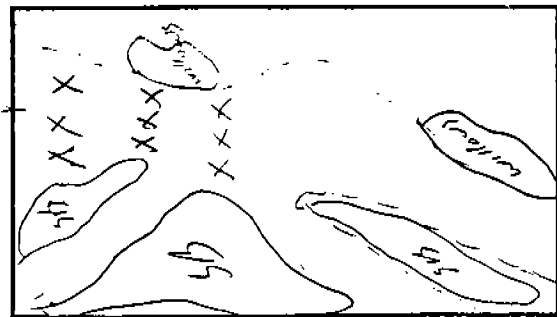


Rip Rap

SMR-3

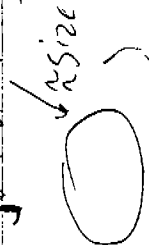
Riffle Sample Locations

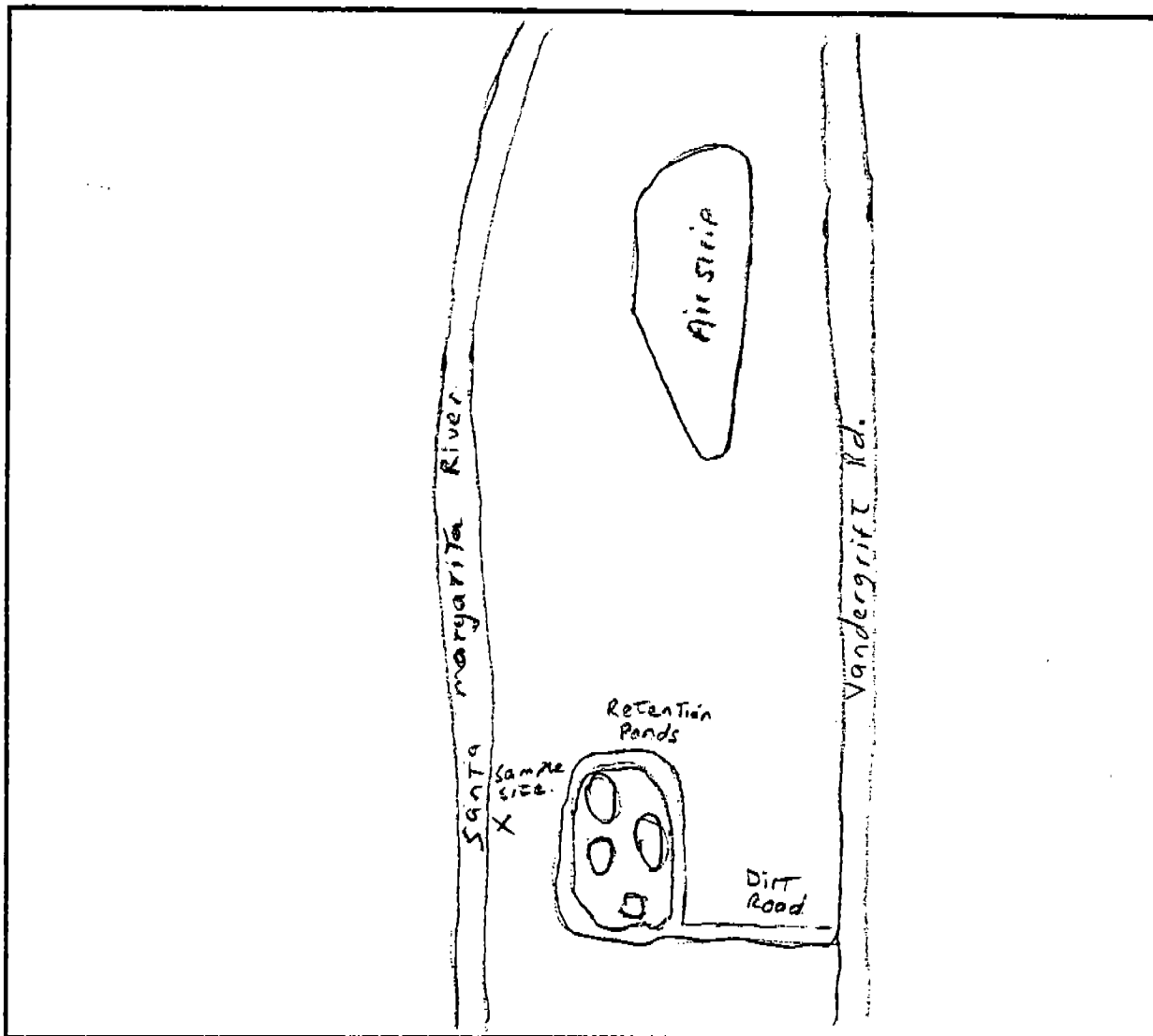
INSECT COLLECTION DATA FORM

Page 2 of 4
 Length 10 meters
 Width 4 meters
Date/Time 3/27/97 Weather OvercastCollector(s) RWK, MC Air/ Temp. 2.60Stream Santa Margarita Below air strip Reach SMR-3Sample Number JUL 31, 2, 3County San DiegoTownship 33° 17' 03.43" N Range 117° 22' 26.73" W
0465173C
3682866A
22'

Comments

This location is typical of SMR. Wide shallow and not many invertebrates are healthy enough to endure living here. I just spent 3 min watching the epibenthic organisms (mostly dytiscid beetles and ^{aquatic} water bugs) over the sand. They are fast and most of them crawling rapidly over the top. A few of the others are living on submerged macrophytes. I saw a giant water bug along the wetted edge in the plant material.



Author of Map MCField Crew MC, BO, CHSMR3

Going south on Vandergrift Rd. Turn right onto
first dirt road just past the airstrip. The dirt road
circles around some water retention ponds.
Water quality and insect samples were taken across from
ponds.

SMR-4

Water Quality - Field Data Collection Sheet

Date 3/19/97 Time 11:30 Weather 80° Overcast Page 1 of 4
 Collector(s) ROCK BO MITC Air Temp. 80°
 Stream Santa Margarita Reach SMR-4, below Diversion Dam TDS = Total dissolved solids

SITE	TEMP.	DEPTH	PH	TIME	DO	mg/L NO ₃	mg/L NH ₄	COND. $\mu S/cm$	TDS	SALINITY
A.	27.0	0.1m	7.6	11:30	11.5	2.3	0.1	110X10	0.61	.001
B.		n/m								
C.		n/m								
D.		n/m								
		n/m								
		n/m								

Comments

NO₂ was in a riffle, pH meter was fluctuating a lot

B. 1

C.

D.

Lat.

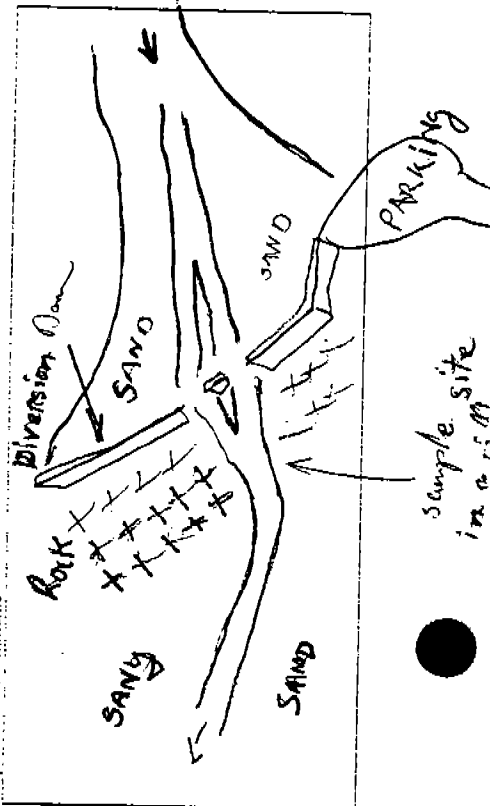
Long.

Map drawing marked on airphoto YES / NO

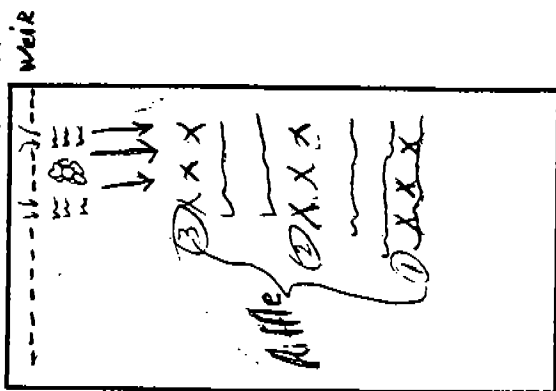
Insects Collected YES / NO

GPS Reading YES / NO

Main additional comments



Riffle Sample Locations
Low Gradient Riffle



Length 39 meters
Width 7.1 meters

INSECT COLLECTION DATA FORM

SMK-4

Page 2 of 4

Date/Time 3/19/97 1145-1258 Weather Clear to hot no clouds
Collector(s) RVK, BO, M Air Temp. 80°F
Stream Santa Margarita below weir Reach SMK 4 below weir
Sample Number SMK 4
County Sandiego Township 33° 20' 463 N
Range 117° 19' 880 W

SAND! Dominant substrate!
making sampling a problem!

Comments

One transect took 20 min to sort we found several dipteran larvae & one possible chironomid. Sand was 3-5" deep in our Kicknet after 2 min

Photos taken, & video of diversion dam.
we sampled Bank left side changed

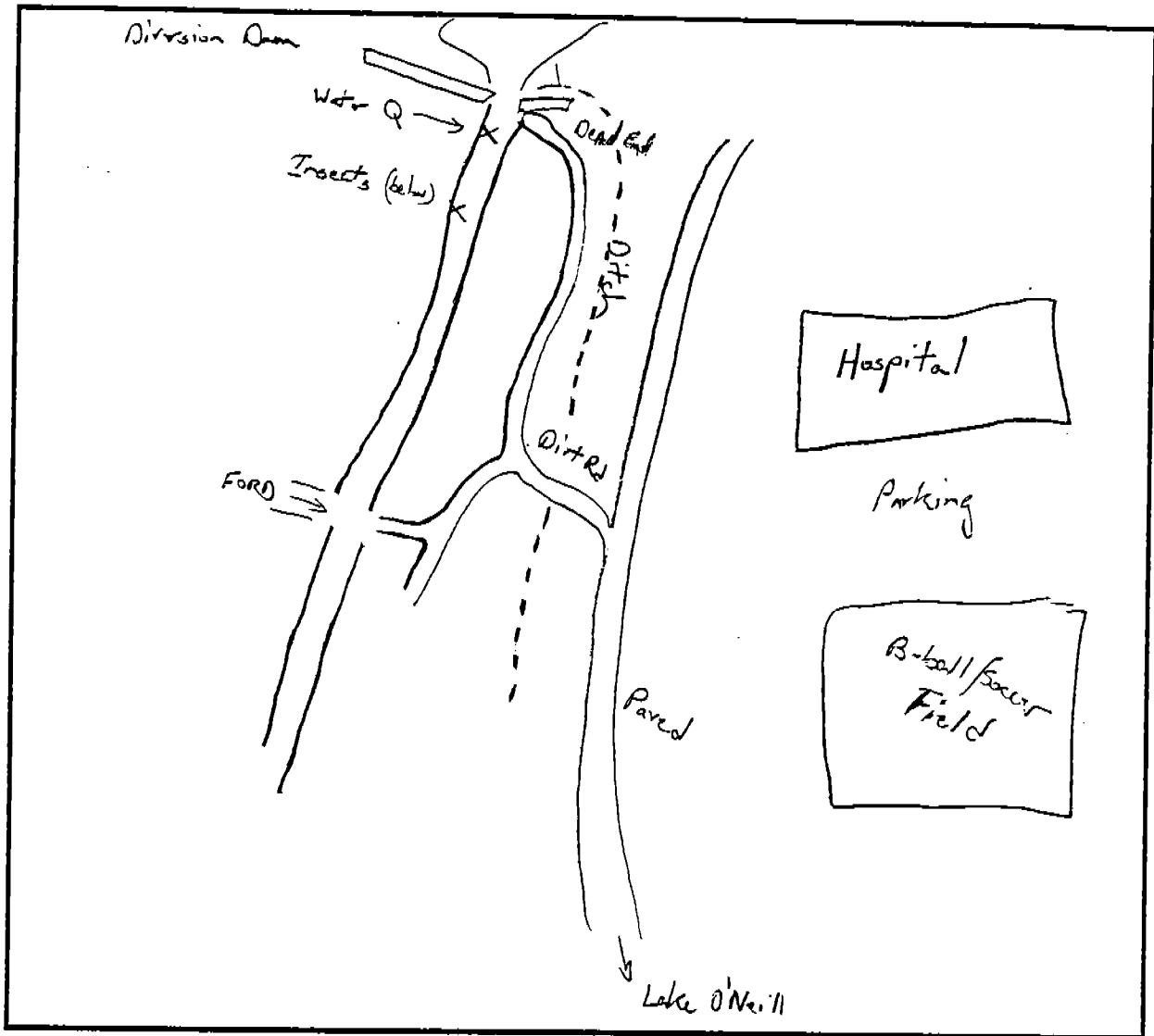
Hand Map of Stream location

Date 3-19-97

3/4

Author of Map MC

Field Crew MC, BO, RK



SMR4

Dirt Road Access From hospital

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SANTA MARGARITA RIVER

Date: Page 9 of 4

Location: SMR-4

Sample site Tallies

Order: Family Genus Species

4.1

4.2

4.3

DIPTERA

Tipulidae

Ø

2

Ø

Simuliidae

Ø

1

Ø

Muscidae

1

Ø

Ø

EPHEMEROPTERA

Baetidae

3

Ø

1

COLEOPTERA

Dryopidae

Ø

Ø

2

HEMIPTERA

Salidae

1

1

Ø

5

4

3

SMR-5

Water Quality - Field Data Collection Sheet

Date 3/14/97 Time 11:00 Weather No clouds, Hot & Sunny Page 1 of 4
 Collector(s) RWK, AO MC Air Temp. 8
 Stream Santa Margarita River Reach SMR-5

TDS = Total dissolved solids

SITE	TEMP	DEPTH	Ph	TIME	A _{cm} D.O.	mg/L NO ₃	mg/L NH ₄	COND.	TDS	SALINITY
A. SMR-5	28°C	0.20m	7.8	1400	8.2	0.08	< 0.01	1.35	.68	< 1
B.		n/m								
C.		n/m								
D.		n/m								
		n/m								
		n/m								

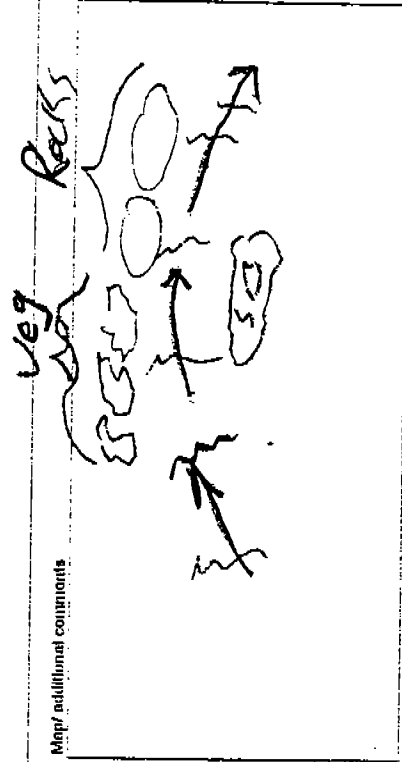
Comments

A ↑ 75 yards of O'Neil Homes Rd Xing

B.
C.
D.

Lat. _____
 Long. _____
 Map drawing marked on airphoto YES / NO
 Insects Collected YES / NO
 GPS Reading YES / NO
040087e 3691447n
33° 21.711 N 117° 14.291 W
elevation 203 FT

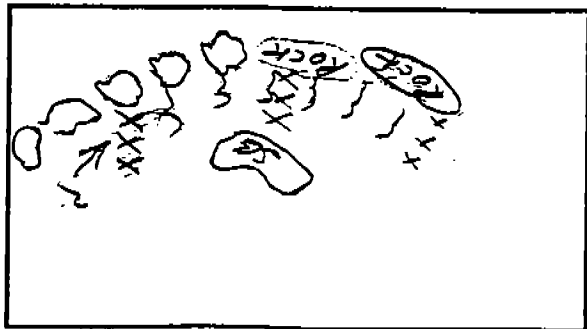
Map additional comments



SMR-5

AS

Riffle Sample Locations



Length 18 m
Width 7 m

INSECT COLLECTION DATA FORM

Date/Time 3/19/97

Collector(s) W.K., B.G., M.C.

Stream San Juan Marguerita River

Sample Number SMR 5

County Sandiego

Township 040087 E Range 33° 21.711' N
3691447 N 117° 19.291' W
Elevation +00203 ft 18.9 m

Weather Nice Sunny

Air Temp. 80's

Reach SMR 5 above weir site
where there was a fire
burning on adjacent hill.

Comments

↑ 75 yards of Oniel Homes Rd. Xing

2nd Sample showed larger organisms really shallow $\approx 0.07''$

3rd Sample showed many Diptera & lots of the small stuff

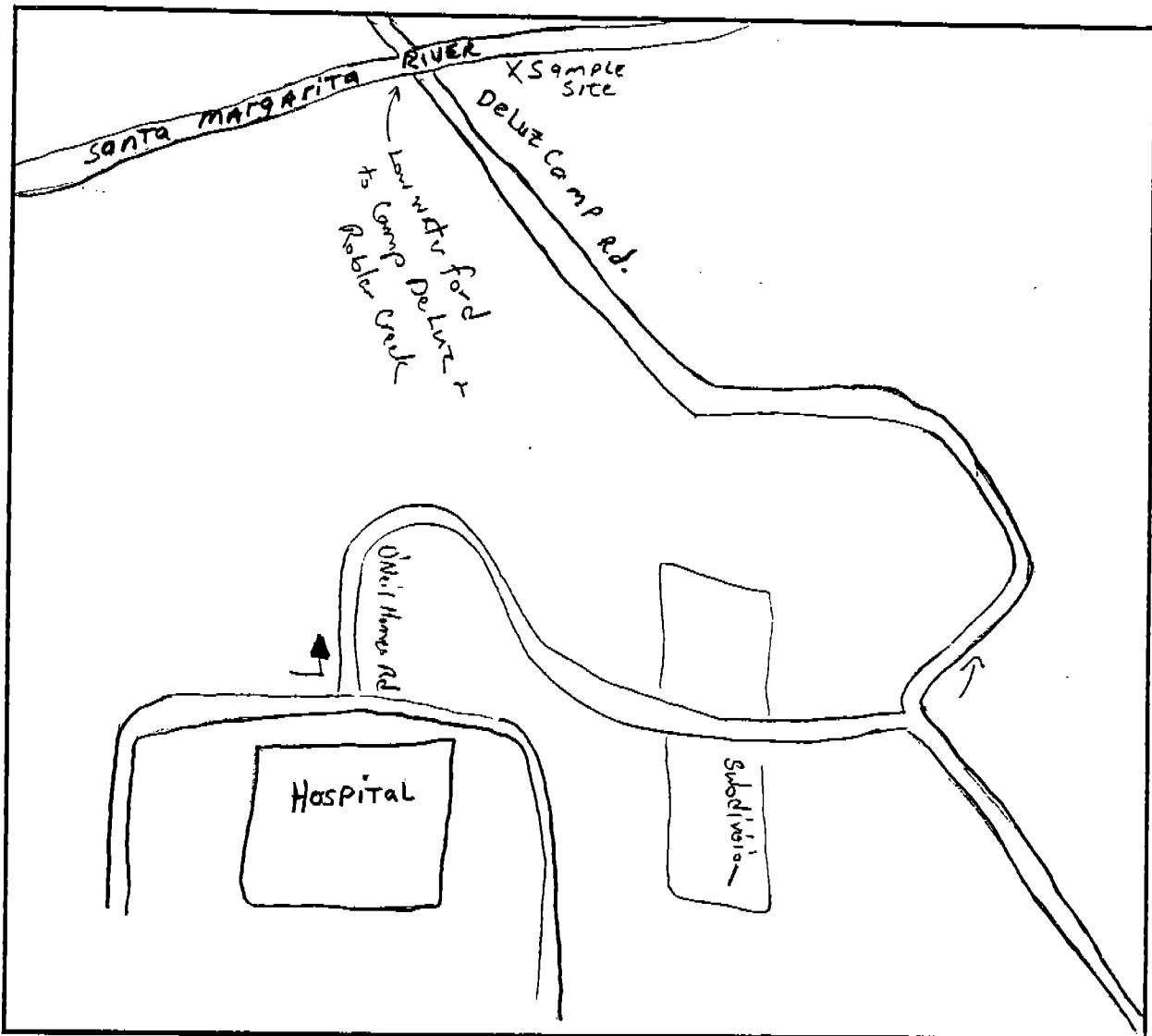
Hand Map of Stream location

Date 3-19-97

Author of Map MC

3/4

Field Crew MC, BO, RK



SMR5

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SANTA MARGARITA RIVER

Date: Page 4 of 4

Location: SMR-5

Sample site Tallies

Order: Family Genus Species

5.1 5.2 5.3

DIPTERA

Tipulidae

0

1

2

Simuliidae

1

0

15

Chironomidae

0

0

1

Chironomidae (all others)

0

0

2

Stratiomyidae

0

0

2

EPHEMEROPTERA

Baetidae

3

3

13

ODONATA

Gomphidae

0

4

0

PLECOPTERA

Amphinemuridae

Malenka sp.

0

0

1

MEGALOPTERA

Corydalidae

Neohermes californicus

0

0

1

HEMIPTERA

Naucoridae

0

1

2

4

9

39

SMR-6

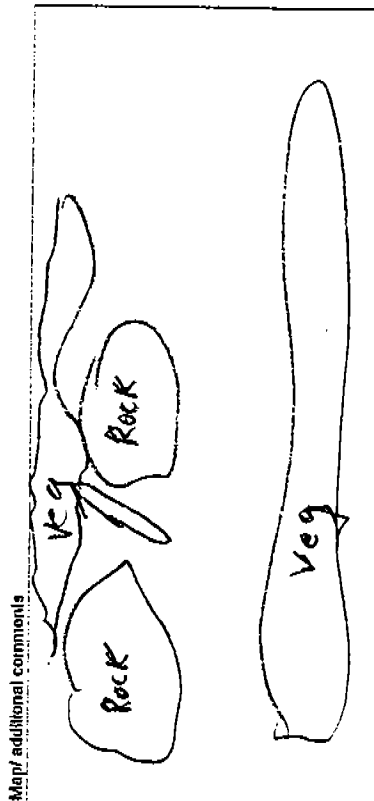
Water Quality - Field Data Collection Sheet

Date 3/6/97 Time 10:10 Weather Sunny - w/sun Page 1 of 4
 Collector(s) ROK, M. B. Gail Postill, Paul Baird Air Temp. 26°C
 Stream San Juan Marguerita River Reach Faintrock SMR-6 Below Deluz Rd. Bridge

SITE	TEMP.	DEPTH	PH	TIME	DO	mg/l	mg/l	COND.	g/L	SALINITY
A5M6	19.0°C	3.0m	7.2	10:30	7.4	0.02		1.5	7.5	0.05
B		n/m								
C		n/m								
D		n/m								
E		n/m								
F		n/m								

Comments (10m x 3m wide)

A. B. C. D.



Map of additional comments

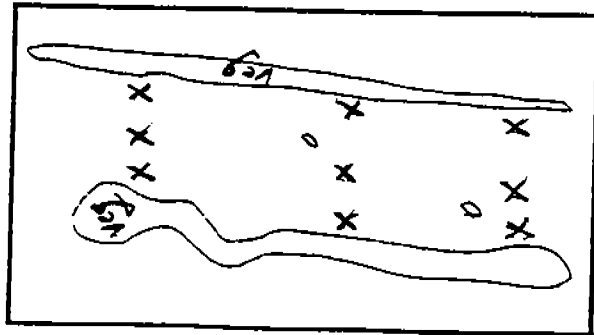
UTM 11S 0475621E
 3695371N

Latt. N 33° 23' 50.55"
 Long. W 117° 15' 43.72"

Map drawing marked on airphoto YES NO
 Insects Collected YES NO
 GPS Reading YES NO

212 ft elev

Rifle Sample Locations



Length 16 meters
Width 7 meters

INSECT COLLECTION DATA FORM

~~SMR-6~~
SMR-6

Page 2 of 4

Date/Time 3/26/97 10:10 am

Collector(s) RUK, B, ML

Stream Santa Margarita Below bridge above temperature
location

Sample Number SMR 6 1, 2, 3

County Sandoval

Township 33° 23' 50.55" N Range W 117° 15' 43.72"

Weather Clear High clouds

Air Temp. 70° F

Reach SMR 6

Comments

Nice area. Lots of algal material on stream bottom. Seining in the field took a lot of time @ this location.

Seined for fish w/small 10' hand seine, found mosquito fish & arroyo chub present

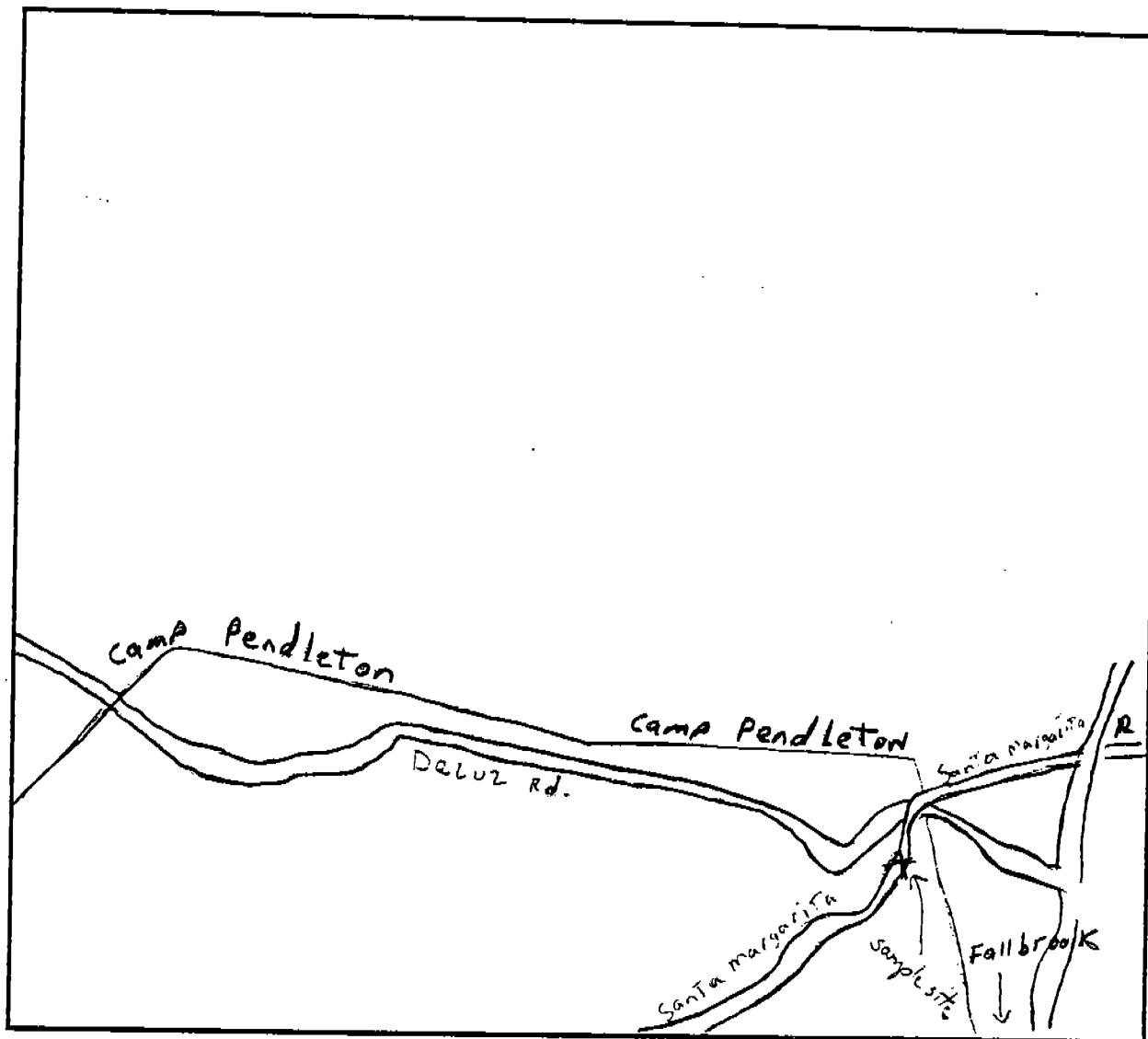
Hand Map of Stream location

Date 3-26-97

Author of Map MC

Field Crew MC, BO, RK

3/4



SMR6

Deluz Rd. sampled DS of Bridge \approx 300 yds

SMR-7

Water Quality - Field Data Collection Sheet

Date 3/25/97 Time 1710

Collector(s) RK MC

Weather Clear 100 clouds

Air/Temp. 27.0

Page 1 of 4

Stream Santa Margarita River

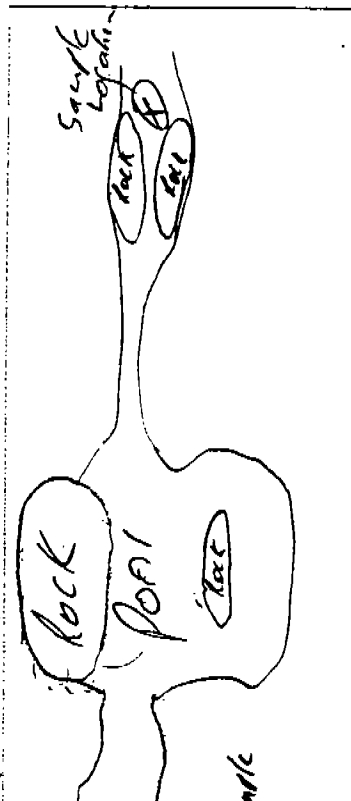
Reach SMR 7

SITE	TEMP.	DEPTH	Ph	TIME	ppm B.O.	mg/L K ₂ Cr ₂ O ₇	mg/L NH ₄	PO ₄	COND. CS/cm	TDS g/L	SALINITY ‰
SMR 7	22.5	1.0 @ 1m	7.4	1725	8.0	1.3	.01		1.41	.71	1810
B.		1m									
C.		1m									
D.		1m									
		1m									
		1m									

Comments

A. This site is close to the access road and makes a nice location for the local kids to go swimming. We sampled insects above the swimming hole.

Map/ additional comments



Lat. N 33° 25.047

Long. W 117° 12.527

Map drawing marked on airphoto

YES ☒ NO ☐

Insects Collected

YES ☒ NO ☐

GPS Reading

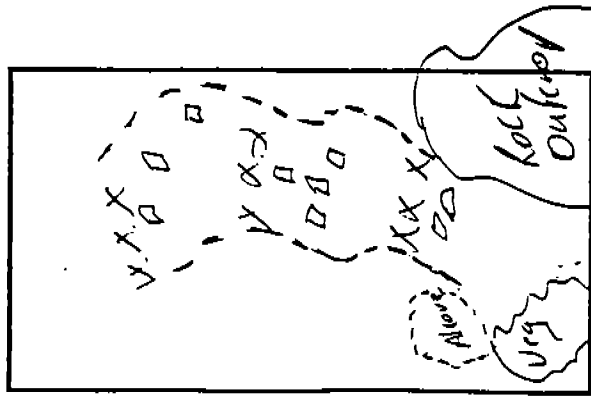
YES ☒ NO ☐

0480570 E

3697583 S

Elevation 1100

Rifle Sample Locations



Length 14 inches
Width 6 inches

INSECT COLLECTION DATA FORM

Date/Time 3/25/77

Collector(s) RK, MC

Stream Santa Margarita River

Sample Number SMR 7.1, 2, 3

County Riverside

Township 33° 25' 01" W Range 117° 12' 52" E

Elevation 1109'

115 0480578e

36479835

Elevation 1100'

Photo taken
VY inc

Comments

The water here is 1' to 13" deep and cobble is 1.5" - 2" size class - many of the rocks are covered with algal material which forms dense mats over most of the benthic area. Catfish & other predators are dense along the wetted edges, Salix willows & canyon live oak are dense along the flood plain. Scum pools & plunge pools form majority of instream habitat types. I hear a bull frog 100 yds downstream bank right.

I think this is how Santa River should look
{ former riparian community standpoint. Sand bars are held in place by several year classes of Salix

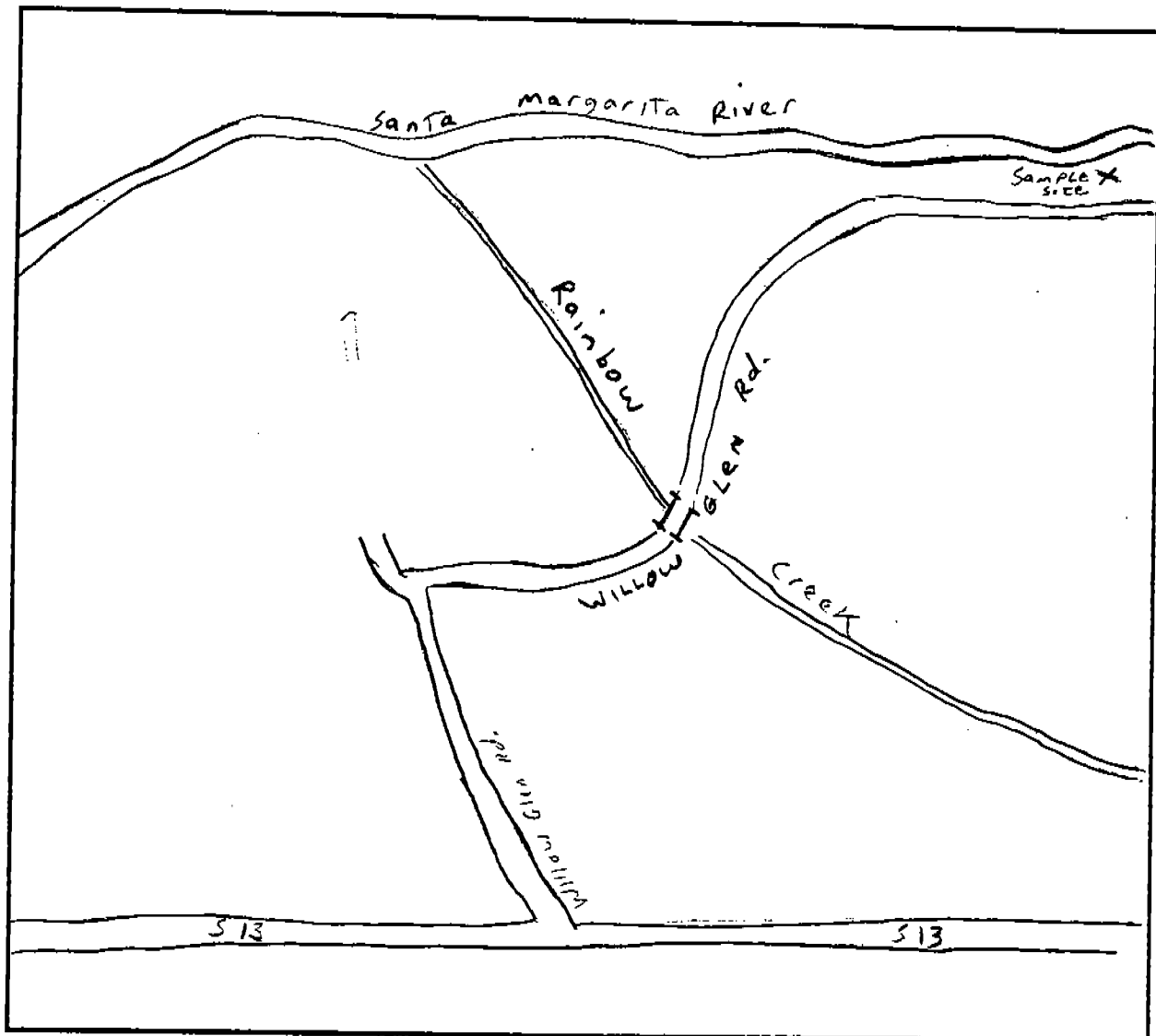
Hand Map of Stream location

Date 3-25-97

3/4

Author of Map MC

Field Crew MC, RK



SMR-7

Going North on I-15 Take exit at Monserate mtn. then turn west on S-13. Willow Glen is a right turn off of S-13. The road will split. Willow Glen is to the right. The water quality and insect sample size was $\frac{1}{4}$ to $\frac{1}{2}$ mile from where the Santa Margarita River starts to parallel Willow Glen Rd.

Water Quality - Field Data Collection Sheet

Date 3-25-97 Time _____ Page 1 of 1
 Collector(s) _____ Weather _____
 Stream _____ Air/Temp. _____
 Ranch _____

SITE	TEMP.	DEPTH	Ph	TIME	D.O.	NO ₂	NH ₄	PO ₄	COND.	S. SOLIDS	SALINITY
A.		n/m									
B.		n/m									
C.		n/m									
D.		n/m									
		n/m									
		n/m									
		n/m									

Comments

A. Could not locate site, NO DATA Collected

B.

C.

D.

Map/ additional comments

Lat.

Long.

Map drawing marked on airphoto

Insects Collected

GPS Reading

YES / NO
 YES / NO
 YES / NO

Could not locate site

SR-9

Water Quality - Field Data Collection Sheet

Date 3/25/97 Time 15.20 Weather cell high clouds wind from west Page 1 of 3
 Collector(s) RK, MC Air Temp. 70°F
 Stream Mudlicka Creek / Santa Margarita River Reach SMK 28

SITE	TEMP.	DEPTH	PH	TIME	DO	mg/L	mg/L	PO4	COND.	TDS	SALINITY
SMK 28	22.6	2.0m	8.3	1515	7.8	3.6	.6		1.9	95	1
		1.1m									
		1.1m									
		1.1m									
		1.1m									
		1.1m									

Total dissolved solids

Comments

several hundred yards of ~~catfish~~ catfish are present on both sides of this sample location

Many additional comments

Lat. N 33° 31.285
 Long. W 117° 10.792
 Map drawing marked on airphoto YES / NO
 Insects Collected YES / NO
 GPS Reading YES / NO
0483296E
3709109 N

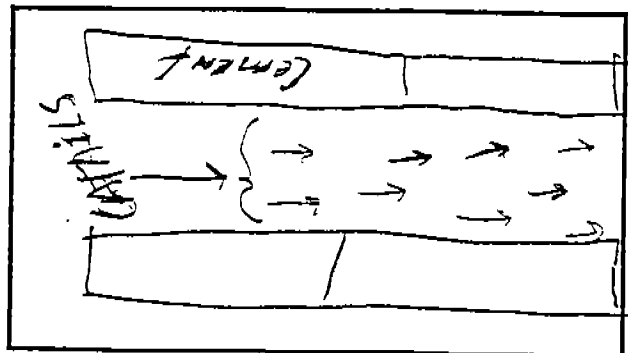
catfish

SMR-9

INSECT COLLECTION DATA FORM

Page 2 of 3

Rifle Sample Locations



Length
Width

Comments

Date/Time 3/23/92 15:15

Collector(s) RK, MC

Stream Murica Creek

Sample Number SMR-9123

County Riverside

Township

Range

N 33° 31.285'

W 117° 10.792'

Elevation 1136'

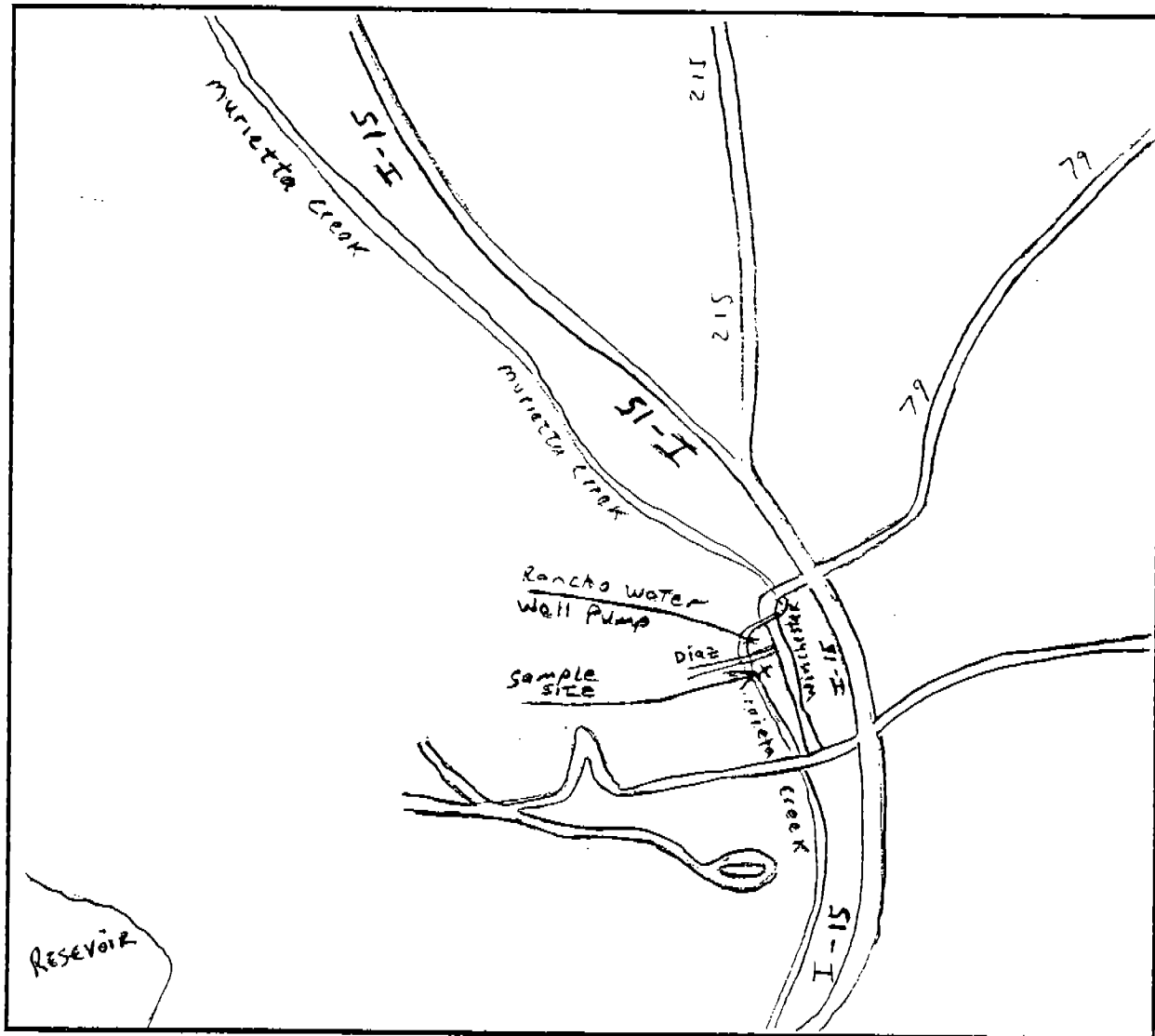
Weather

Air Temp.

Reach SMR-9

No insects to collect.

This stream has been channelized, with acres of catails & other exotic preatophytes growing in the cement embankments



SMR-9 (MURRIETA CREEK)

Going North on I-5 get off at the 79 North exit.
Instead of going north on 79 Turn left toward Temecula.
Take Diaz Street to Winchester. Road at corner runs behind
parking lot and stores. The water quality site was $\frac{1}{4}$ mile
from Diaz and Winchester intersection. There was a Rancho Water
Well pump near the sample site. There also was a reservoir across
the road from the pump up on the hillside.

Water Quality - Field Data Collection Sheet

Date 3/21/97 Time 9:40 am

Collector(s) RWK

Stream San Mateo Creek

Weather Overcast

Air Temp. 70°F

Reach SMC 2

Page 1 of 4

SMC-1

SITE	TEMP.	DEPTH	pH	TIME	D.O.	mg/l	mg/l	COND.	TS	S-SOLIDS	SALINITY
ADJMC1	18°C	1.5 Dm	7.7	9:45	9.0	2.1	7.01	6.1X10	34	34	0
		ft/m						68 on	2/2		
		ft/m						well unit			
		ft/m									
		ft/m									
		ft/m									
		ft/m									

1/2 thickness of water line above zero = 0

Comments

Relative to the embedness observed the conductivity & TDS values were lower than I expected. Question: do Zn/bioh compounds make water more porous, i.e. less conductive? what effect do they have on TDS values.

Map/ additional comments

N 33° 24' 23.22" W 117° 34' 31.80"

Map drawing marked on airphoto ☒ YES ☐ NO

Insects Collected ☒ YES ☐ NO

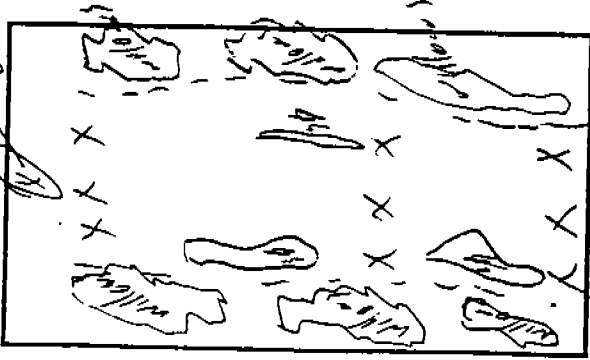
GPS Reading ☒ YES ☐ NO

Agriculture fields

elevation 48'

SP10.014

Riffle Sample Locations *frequency*



Length 27 m
Width 5 m

INSECT COLLECTION DATA FORM

SMC-1 ~~retest~~
Page 2 of 4
Weather High Clouds
Air Temp. AE
Reach SMC 1 in Tomato Fields

Date/Time 3/21 9:15
Collector(s) RAK, MC, BO, AA
Stream Sun Mated Creek
Sample Number SMC 1
County Sandwich County
Township N 33 24' 23.22 Range W 17 34' 31.80
Elevation 48'

Comments

This site is downslope from several miles of agriculture land (growing tomatoes) on both sides of the stream. Bruce took photos here, algal material up a 20-30% Alex Aber, COFC, with us.

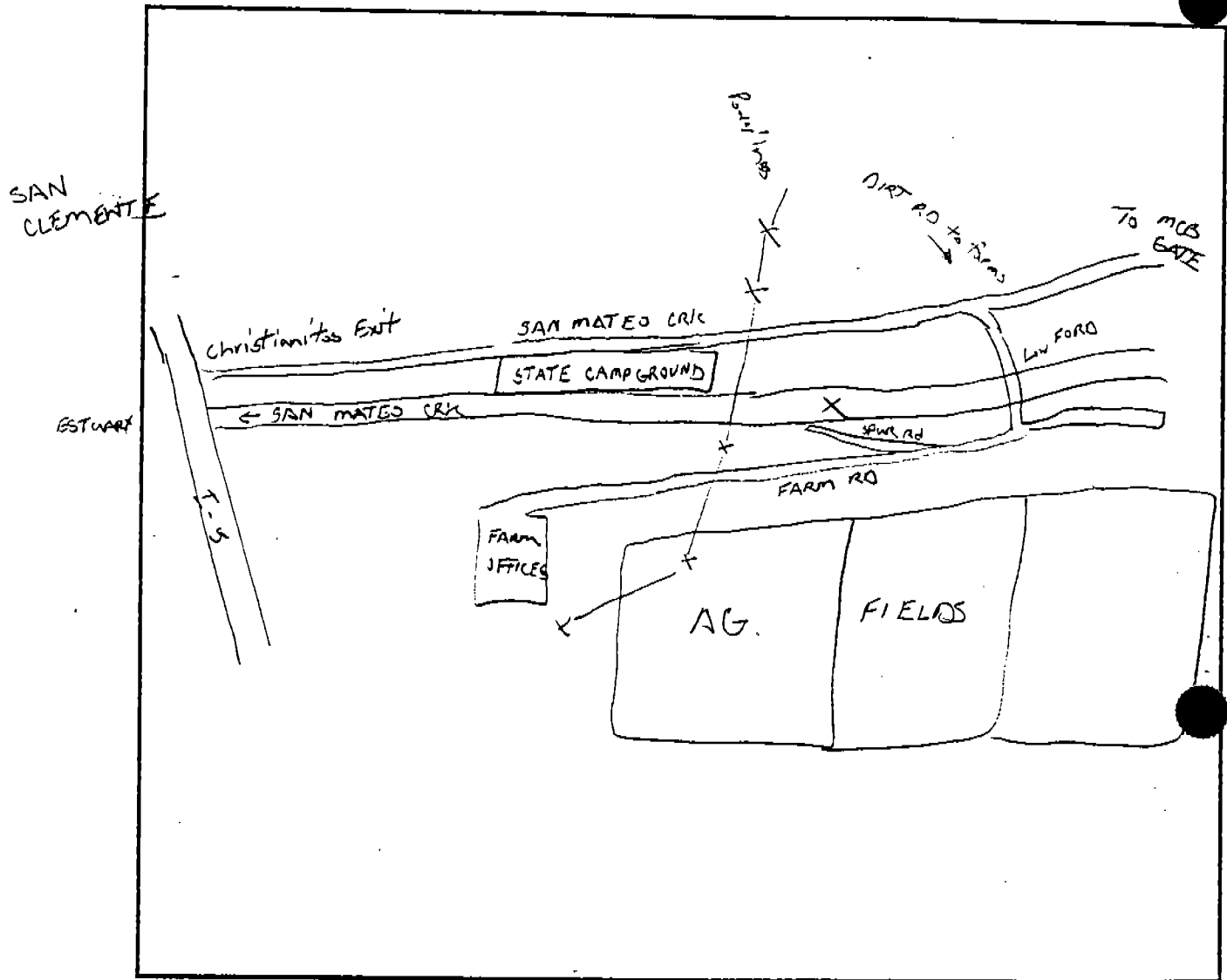
Hand Map of Stream location

Date 3-21-97

Author of Map MC

Field Crew MC, BO, RK

3/4



SMC-1

SMC-2

Water Quality - Field Data Collection Sheet

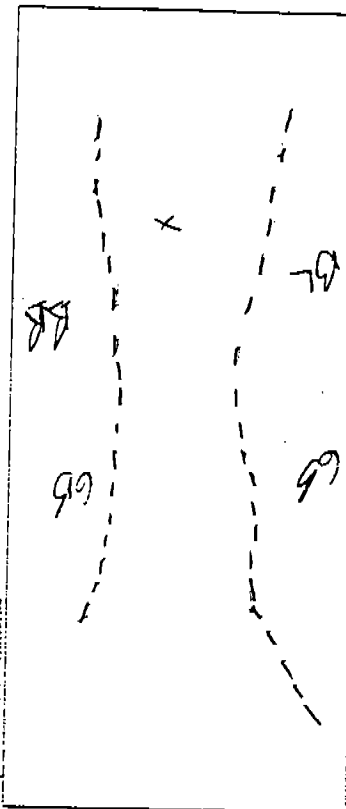
Date 3/20/07 Time 16:45 Weather High clouds most clear Page 1 of 4
 Collector(s) RWK, BD, ML AirTemp. 22 high 70° F
 Stream San Mateo Crk Reach SMC 2 (below Range 314)

SITE	TEMP.	DEPTH	PH	TIME	ppm DO	mg/L NO ₃	mg/L NH ₄	COND. µS/cm	TDS	% S-SOLIDS	SALINITY
A. SMC2	17°C	1.9' @ 1m	7.5	17:50	12	3.2	< 1	57 µS/cm	29	2/2	< 0.1 ppt
B.		0.1m									
C.		0.1m									
D.		0.1m									
		0.1m									
		0.1m									

Comments

A. Spawning gravel present 6 meter x 6 meter section @ SMC 22 site (Heavily embedded)
 B. lg rocks 10" x 10" all the way down to fine gravel present Riparian community
 well established along both banks

Map/ additional comments



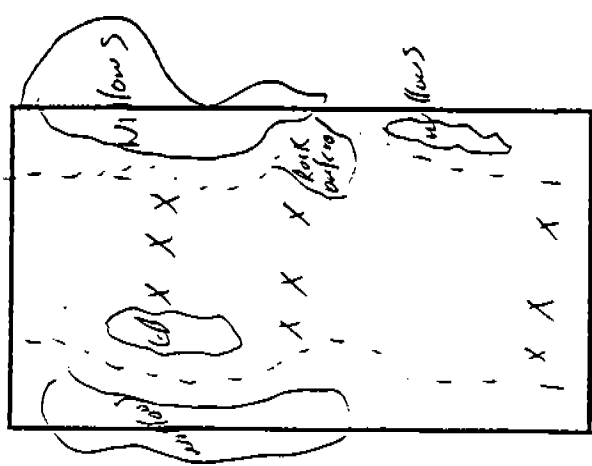
Lat. N 33° 25.404
 Long. W 117° 31.881

Map drawing marked on airphoto ☒ YES ☐ NO
 Insects Collected ☒ YES ☐ NO
 GPS Reading ☒ YES ☐ NO

04505300
3698592.1
 elevation 171 Feet

SMC-2

Riffle Sample Locations



Length 20 meters
Width 6.5 meters

INSECT COLLECTION DATA FORM

Page 2 of 4

Date/Time 3/20 1650

Collector(s) RAIK, BO, MLC

Stream San Mateo (below Range 314)

Sample Number SMC 2.1 2.2 2.3

County San Diego

Township 450530E Range 3698592N

elevation 171 feet

N 33° 25.404

W 117° 31.881

Weather Clear High clouds

Air/Temp. 22.70°

Reach SMC 2

Comments

^{SMC #}

Horse-hair worm from 2.2 is in separate jar. Nice Corandilla's caught here & 1" in length (not crullis)

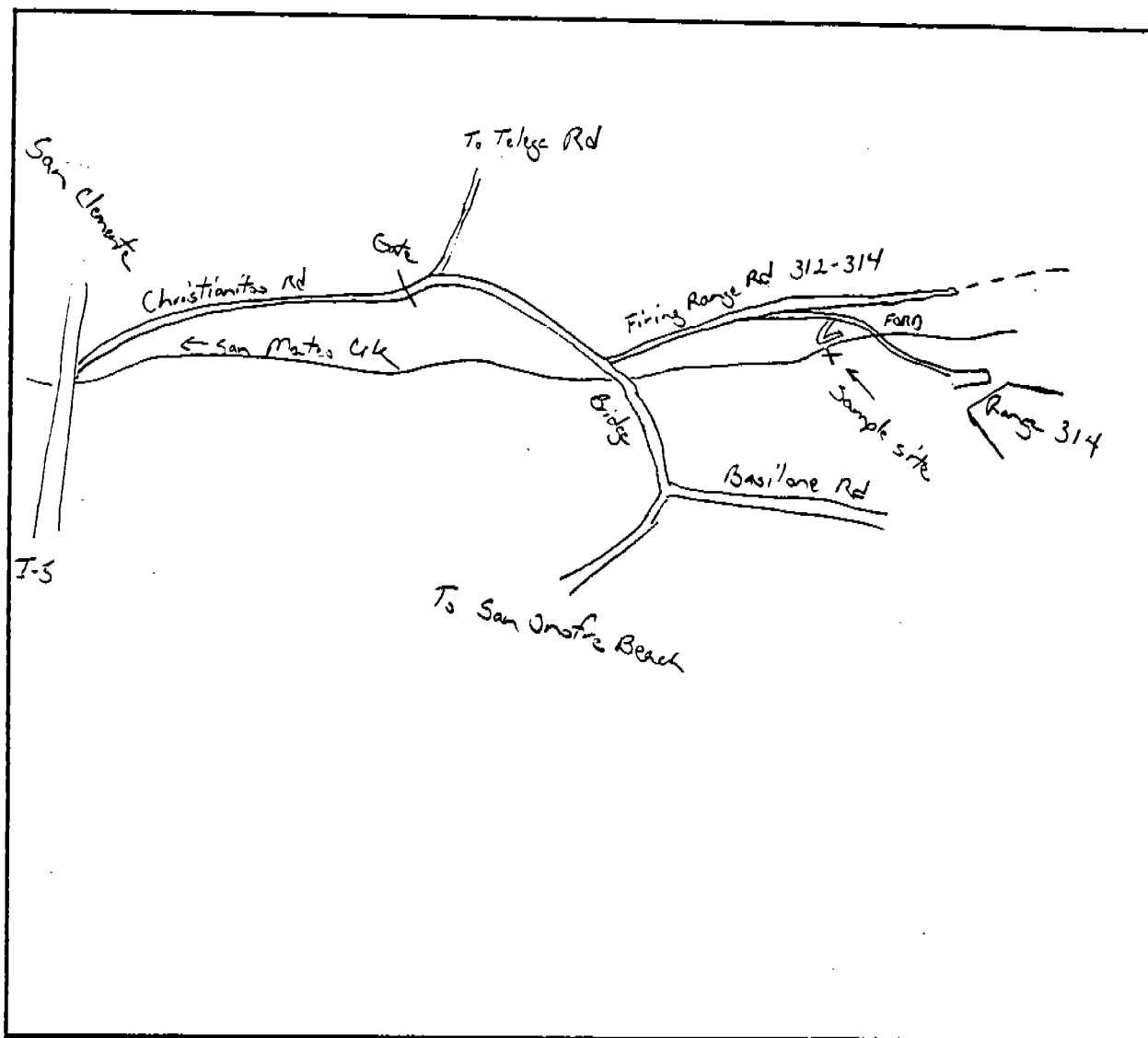
Hand Map of Stream location

Date 4/7/97

Author of Map Bruce O

Field Crew RK, BO, MC

3/4



Sme - 2

Take I-5 to Christianitas Rd go thru gate, turn left on Range 314 Road before crossing bridge over San Mateo. Go up about one mile turn right on Range 314 Road. Turn off on dirt road to the right before reaching road crossing.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEK

Date: _____ Page 4 of 4

Location: SMC - 2

Sample site Tallies

[illegible]

SMC-3

Water Quality - Field Data Collection Sheet

Date 3/21/97 Time 1700 Weather Hazy clouds, clear Page 1 of 4
 Collector(s) RAK, BO, MC AirTemp. 57.0° F
 Stream San Mateo Creek Reach SMC 3

SITE	TEMP.	DEPTH	PH	TIME	PPM	mg/l	mg/l	mg/l	COND.	COND.	TDS	%	SALINITY
A. SMC3	18.2	1.60	6.8	1700	8.4	1.6	2.1	0.36	18	3/4	5X10		
B.													
C.													
D.													

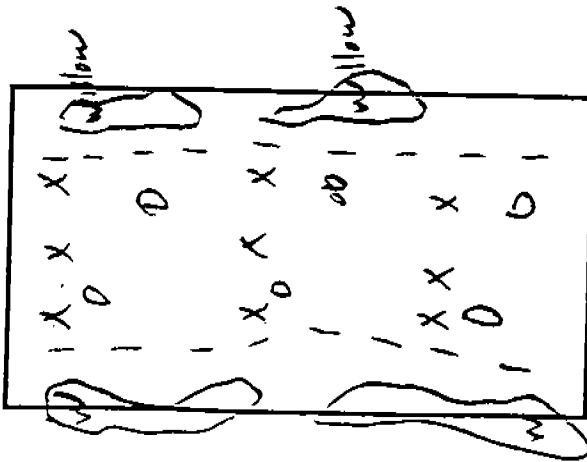
Comments

A. lg cobbles were present throughout this creek. Cobble is very embedded hard
 to move while kick net sampling

Lat. N 33° 28' 08.62
 Long. W 117° 28' 35.43
 Map drawing marked on airphoto ☒ YES / ☐ NO
 Insects Collected ☒ YES / ☐ NO
 GPS Reading 0455725c
37033671

Map/ additional comments
 Road crossing
 Collection site
 Willow
 Willow
 Willow

Riffle Sample Locations



Length 22 meters
Width 7 meters

INSECT COLLECTION DATA FORM

Date/Time 3/21/97 1710
Collector(s) Rex BO MC
Stream San Mateo Creek
Sample Number SMC 3
County San Diego
Township N 33° 28' 08.62 Range W 112° 26' 35.43

SMC3

Page 2 of 2

Weather Clear high clouds
Air Temp. 70° F
Reach Below Tekega road
Crossing SMC at 200'

Comments

Substrate is very embedded, hard to loosen while kick net sampling

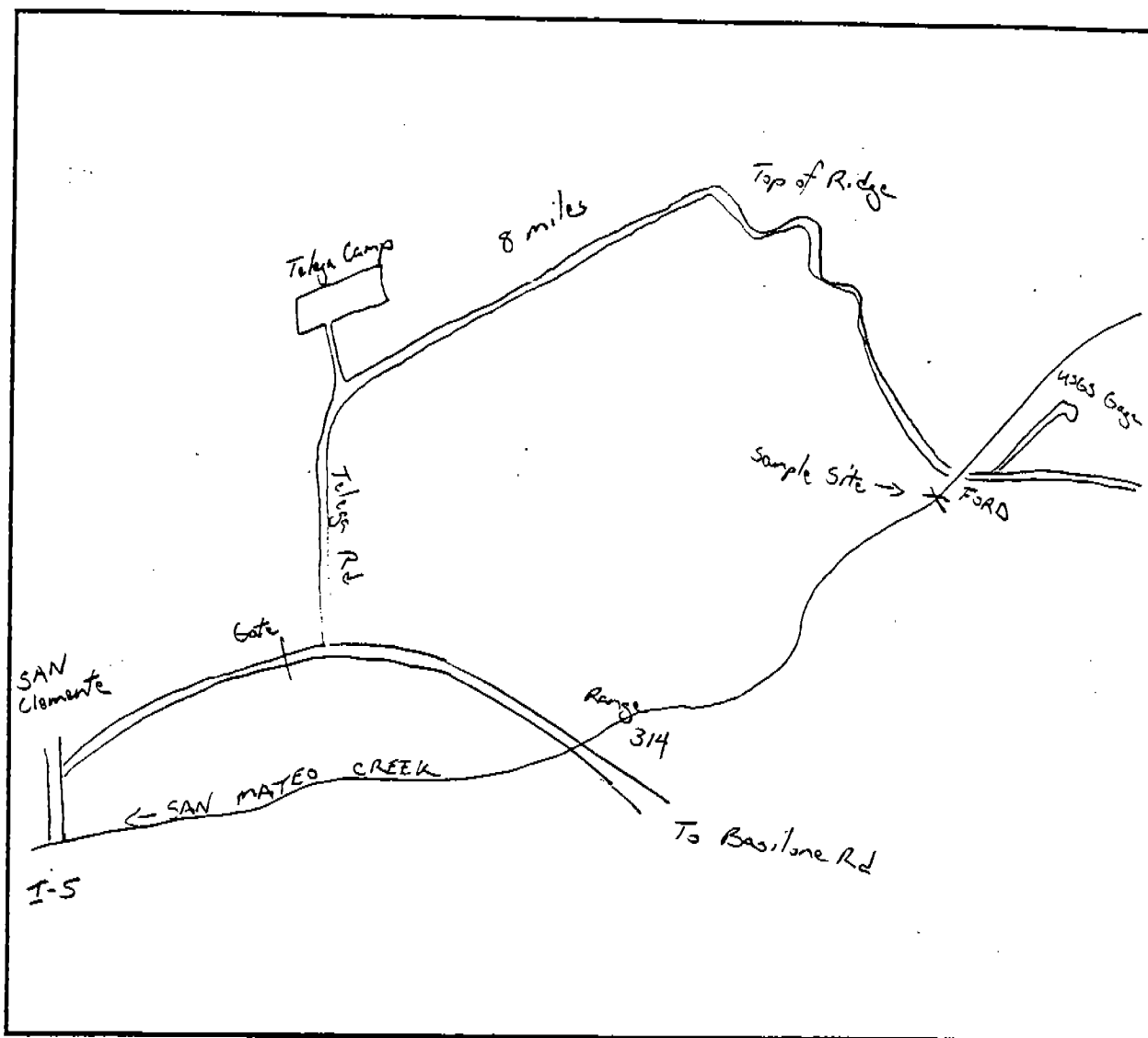
Hand Map of Stream location

Date 4/7/97

Author of Map Bruce O

Field Crew Rk, Bo, MC

3/4



SMC-3

Take Telega Road from North end of Base up & over ridge into SMC canyon. At low water crossing walk OS 200'

Takes 30-45 min to get here from I-5. 9 stream crossings on Telega Creek, OK for 2-WD trucks.

CAMP PENOLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEKDate: _____ Page 4 of 4Location: SMC-3

Sample site Tallies

Order	Family	Genus	Species	3.1	3.2	3.3
<u>Diptera</u>						
	<u>Tipulidae</u>				1	
	<u>Simuliidae</u>			18	8	
	<u>Chironomidae</u>			3	2	4
	<u>Chironomidae (all other)</u>			7	4	3
	<u>Stratiomyidae</u>			1	6	
	<u>Ephydriidae</u>			8	3	
<u>Ephemeroptera</u>						
	<u>Baetidae</u>			46	51	69
	<u>Caenidae</u>			12	14	43
<u>ODONATA</u>						
	<u>Gomphidae</u>				1	
<u>Plecoptera</u>						
	<u>Amphineuridae</u>			6	9	19
	<u>Isoperline</u>			3	14	7
	<u>Nemouridae</u>			6	3	16
<u>TRICOPTERA</u>						
	<u>Hydropsyche oslari</u>			6		35
	<u>Hydroptilidae</u>			4		22
	<u>Polycentropoidae</u>					3
	<u>Lepidostomatidae</u>					
	<u>Lepidostoma sp.</u>				43	
<u>MEGALOPTERA</u>						
	<u>Corydalidae</u>			1	1	2
<u>Colleoptera</u>						
	<u>Dryopidae (Adults)</u>			2	1	2
	<u>Gyrinidae</u>			3		2
	<u>Dytiscidae</u>			5	9	1
	<u>Hydrophilidae (Adults)</u>				2	4
<u>Hemiptera</u>						
	<u>Gerridae</u>			1		1

SMC-4

Water Quality - Field Data Collection Sheet

Date 3/21/77 Time 12:05 noon Weather High clouds
 Collector(s) RMK, GO, MC, Alex Alor Air Temp. 72 80°F
 Stream SMC GWS upper gage Readi. 1st pool W's gage

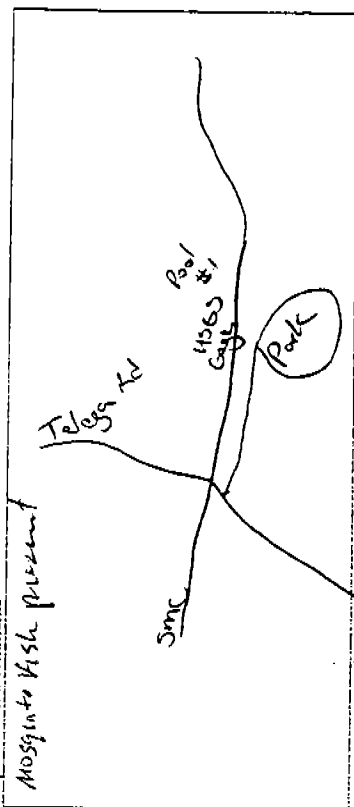
Page 1 of 4

SITE	TEMP.	DEPTH	PH	TIME	DO	mg/L NO ₃	mg/L NH ₄	COND	S-SOLIDS	SALINITY
A.	18.0	1/20m	7.5	1200	9.6	2.1	Neg	60	.31	.2
B.		ft/m							2/l	
C.		ft/m								
D.		ft/m								
		ft/m								
		ft/m								

Comments

A.
B.
C.
D.

Map/ additional comments



Lat. N 35° 28' 14.16" 81.0
 Long. W 117° 28' 18.37" 373

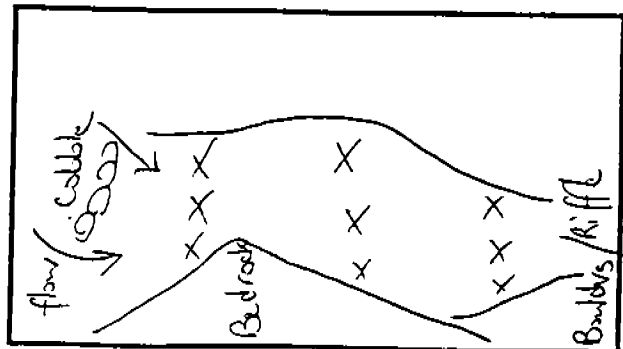
Map drawing marked on airphoto ☒ YES ☐ NO
 Insects Collected ☒ YES ☐ NO
 GPS Reading ☒ YES ☐ NO

N 3103567
E 0456162

W. 392'

INSECT COLLECTION DATA FORM

Riffle Sample Locations



Length 13.5m
Width 7m

Date/Time 3/21/97

Collector(s) BO, MC, RK, Alex Velez

Stream San Mateo Crk, Devil Canyon Confl.

Sample Number SMC-4.1

County San Diego Co.

Township _____ Range _____

Weather Clear

Air Temp. _____

Reach _____

Comments

Pool habitat above Devil Canyon Confluence

mosquito fish or Bullheads present.

4 x stripe after snakes & pebbles/riffles

stripe

description of sample

stripe

nothing on hand

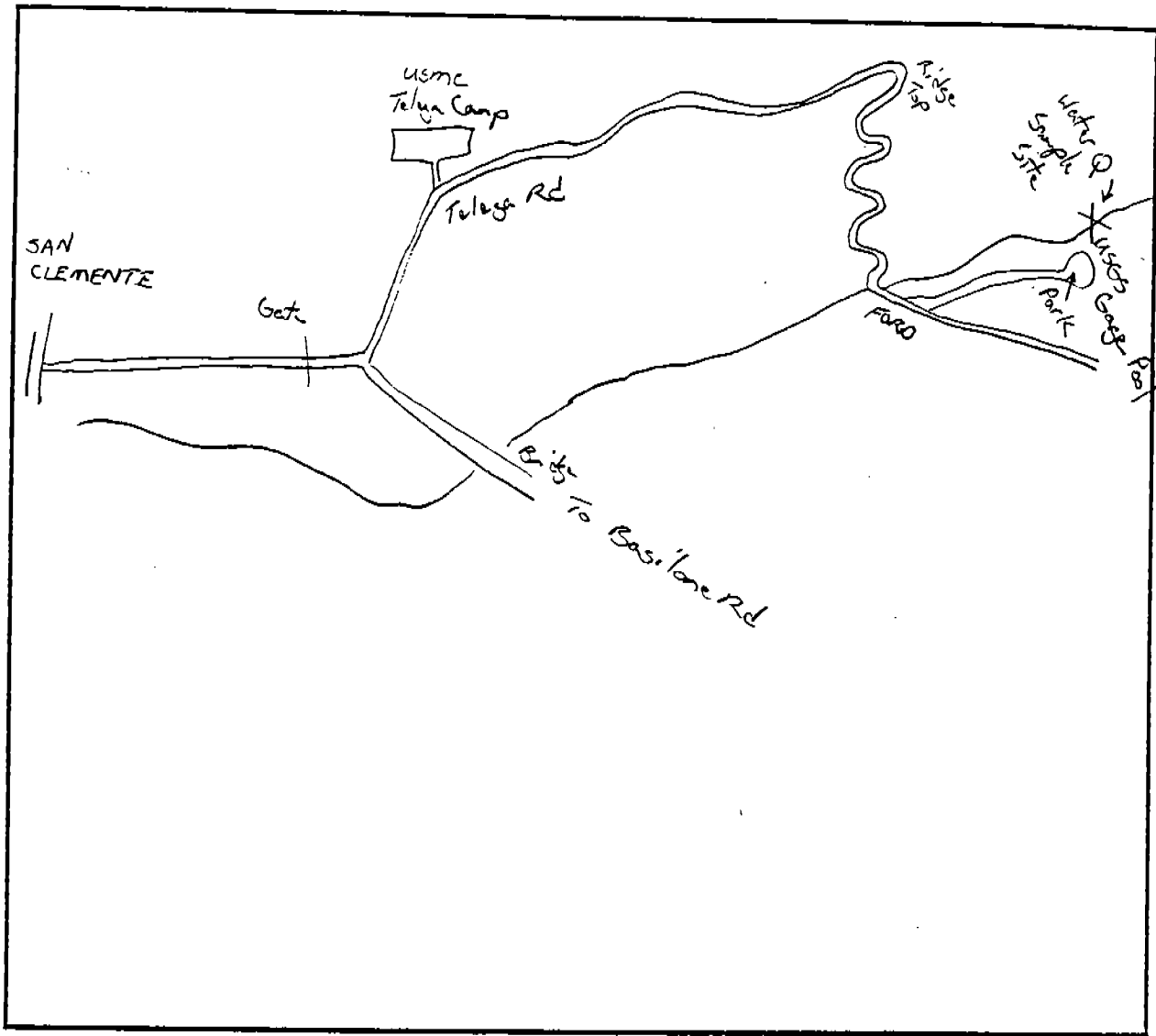
Hand Map of Stream location

Date 4/7/97

Author of Map Brund O

Field Crew Bo, MC, RK, AA.

3/4



SMC-4

Sample Water Q @ USGS Gage pool, just UPS in riffle area.
Then walked 3/4 mile UPS to Devil Canyon + sampled insects
in riffle/pool above confluence

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN MATEO CREEKDate: _____ Page 4 of 4Location: SMC-4

Sample site Tallies

Order: _____ Family _____ Genus _____ Species _____

4.1 4.2 4.3

DIPTERAChironomidae

2

Chironomidae (all others)

5

3

Stratiomyidae

2

Ephydriidae

4

EphemeropteraBaetidae

55

13

63

Caenidae

10

12

8

Leptophlebiidae

1

Siphonuridae

1

ODONATACoenagrionidae

4

1

Comphidae

1

1

1

Plecoptera

2

Amphinemuridae

2

Isoperlinae

12

1

1

Tricoptera

1

Hydropsychidae

12

10

Hydrptilidae

7

16

PhilopotamidaeWormaidia sp.

8

6

MegalopteraCorydalidae

2

ColleopteraElmidae

1

Dytiscidae

6

4

4

Halipidae

2

Hydrophilidae

1

2

131 69 84

SME-5

Water Quality - Field Data Collection Sheet

Date _____ Time _____ Weather _____ Page 1 of 1

Collector(s) _____ Air Temp. _____

Stream _____ Reach _____

SITE	TEMP.	DEPTH	Ph	TIME	D.O.	NO2	NH4	PO4	COND.	S. SOLIDS	SALINITY
A.		n/m									
B.		n/m									
C.		n/m									
D.		n/m									
		n/m									
		n/m									
		n/m									

Comments

A. _____

B. _____

C. _____

D. _____

Map/ additional comments

Not Sampled due to time constraints

Lat. _____

Long. _____

Map drawing marked on airphoto YES / NO

Insects Collected YES / NO

GPS Reading YES / NO

SMC-6

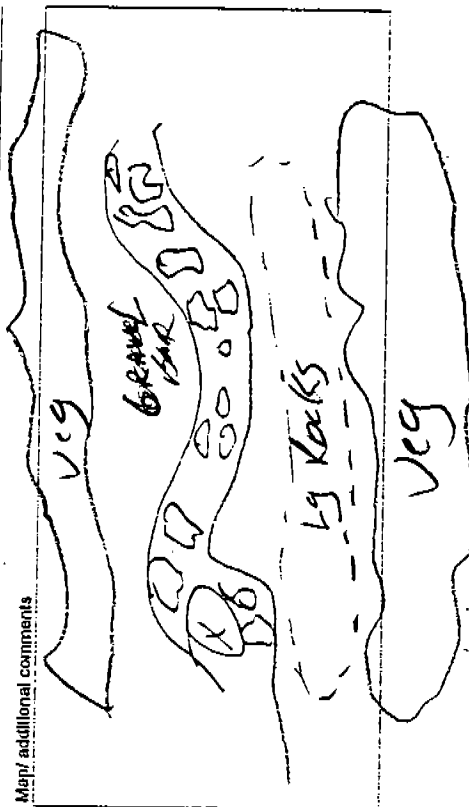
Water Quality - Field Data Collection Sheet

Date 3/25/97 Time 11:50 Weather cool slightly overcast Page 1 of 4
 Collector(s) RR Air Temp 70°F
 Stream San Mateo Below Falls Reacht. SMC 6

SITE	TEMP.	DEPTH	PH	TIME	DO	mg/L	mg/L	mg/L	COND.	TPS	S-SOLIDS	SATINITY
A SMC 6	17.0°C	3.0m	7.0	11:53	8.5	2.1	.2		.59	.30	2/L	8
B.		n/m										
C.		n/m										
D.		n/m										
		n/m										
		n/m										

Comments

A California newt, gambusia tadpoles, 2 stripe barfer snake were all seen here
 & The Stream morphology was one of huge substrate 3'-5' diameter B.S. small
 & spawning gravel was not located. There were many (relative frequency) small flange
 & pools spaced closely together



Map of additional comments

Lat. N 33° 32' 58.65
 Long. W 117° 23' 46.32

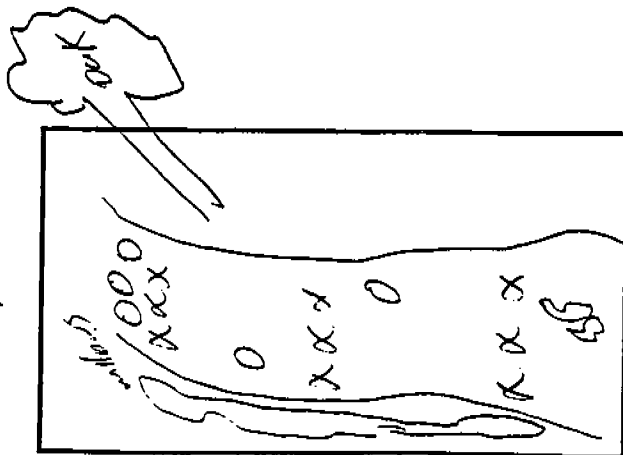
Map drawing marked on airphoto ☒ YES ☐ NO
 Insects Collected ☒ YES ☐ NO
 GPS Reading ☒ YES ☐ NO

04632.77C
3712221 N

Elevation 1264

SMC-6

Rifle Sample Locations



Length 15 meters
Width 3 meters

INSECT COLLECTION DATA FORM

Page 2 of 4

Date/Time 3/25/97

Collector(s) RK, MC

Stream Sacramento below confluence of Fork Falls

Sample Number SMC 6.1, 2, 3

County Riverside

Township 33° 32' 38.65" N Range 117° 23' 46.23" W
Elevation 1264

Weather cool, high clouds

Air Temp. 27.0 °F

Reach SMC 6 below confluence south west of parking lot below crossing of driveway road

Comments

After site selection we found there to be a lot more silt & sand than we had expected to find. This was the most homogeneous feel we could find relative to SMC-3 and SMC-2, I would call this a L6K anywhere else. It does resemble other sample sites though we found 4 California Newts in our sample area.

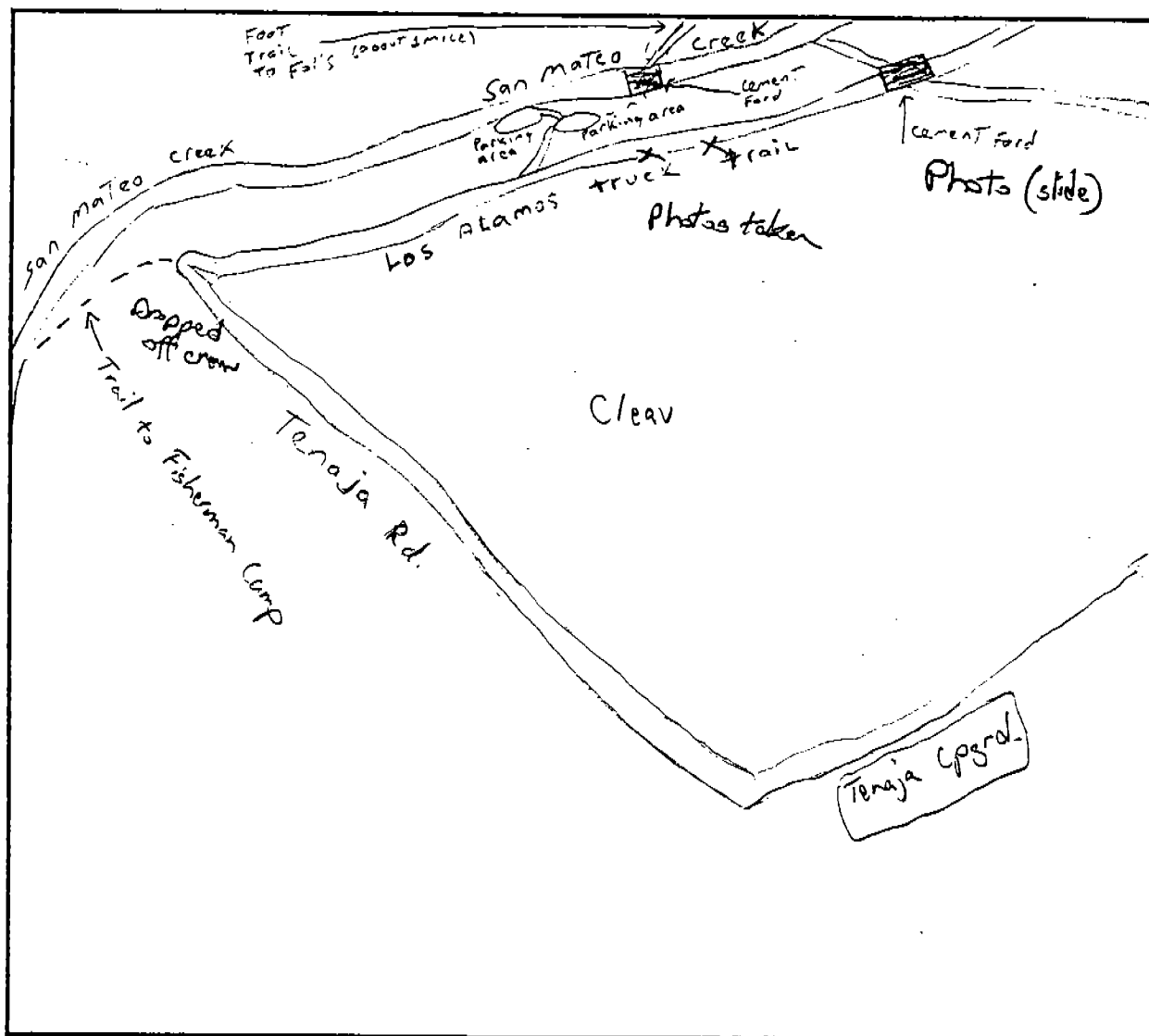
Hand Map of Stream location

Date 3-25-97

Author of Map MC

Field Crew MC, RK

3/4



SMC 6 - Below falls in Cleveland Nat. Forest

Water quality and insect samples were taken 25 yards upstream of lower parking area along San Mateo Creek.

SOC-1

Water Quality - Field Data Collection Sheet

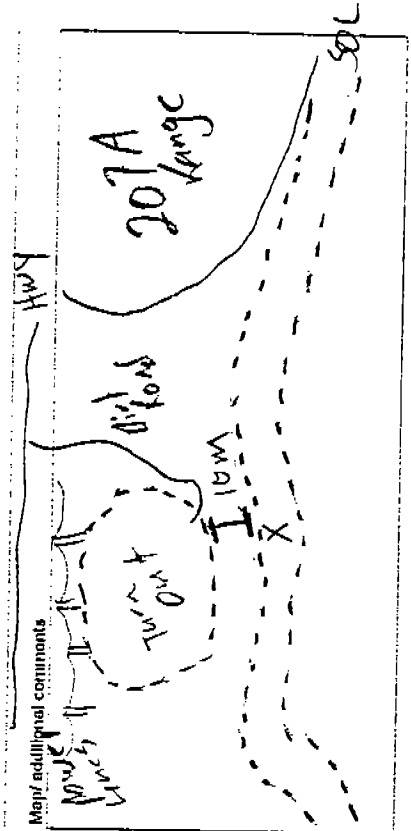
Date 3/20/97 Time 1615 Weather Clear Page 1 of 4
 Collector(s) KWK BO MC Air Temp: 80°F
 Stream Sun Oneirc (below 207A Range) Reach SOL1

3/21/97

SITE	TEMP.	DEPTH	PH	TIME	ppm D.O.	mg/L NO ₃	mg/L NH ₄	PO ₄	COND.		SALINITY
									COND.	TDS	
A SOL1	25°C	1.0m	6.9	15:20	8.1	3-5	>07		216 mS/cm	48 g/gal	
B SOC1	13	5.0m		0730	9.2						
C.		1.0m									
D.		1.0m									
		1.0m									
		1.0m									

Comments

Sample location is 1/2 mile below Range 207A.
 We sampled thawing for temp @ 24° we sampled a sub surface bank
 to seepage area for temp 16° (change of 8°)



N 33° 23.328'
 W 117° 32.632'

Lat.

Long.

Map drawing marked on airphoto

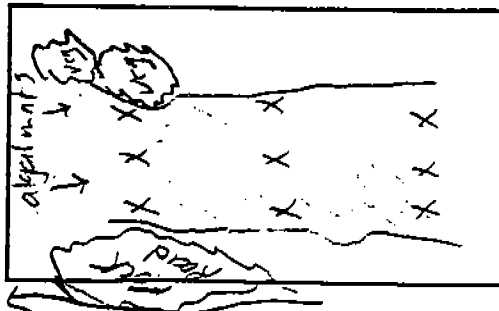
Insects Collected

GPS Reading

0-149428 e'

3694501 N

Rifle Sample Locations



Length 32 meters
Width 5 meters

INSECT COLLECTION DATA FORM

SOC-1

Page 2 of 4

Weather Clear, Easley wind
Air Temp. 80°F Dry hot
Reach SOC

Date/Time 3/20/92
Collector(s) RWK, BD, MC
Stream San Diego Creek
Sample Number SOC1
County San Diego
Township N33° 33' 32" Range W117° 32' 632"
Ekunon 62' 0444428 E
369450 N

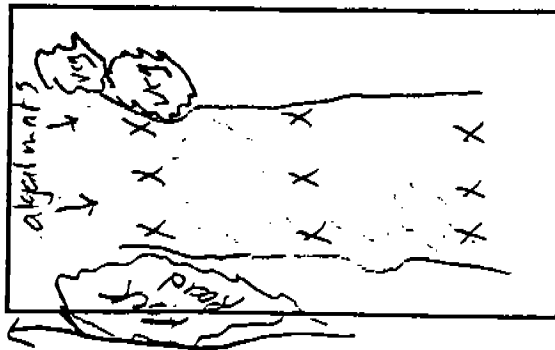
Comments

Algal mats were continuous throughout the reach, warmer water & possibly
↑ organic input from the STF upstream appear to have increased diversity here
This site is warm, slow flowing, & ↑ productivity seems to be thriving thus ↑ the abundance
and overall ↑ diversity values. Collected 10-15 tanguiours

3 Photos taken (1 of pool 05, 1 of site)

SOC-1

Riffle Sample Locations



Length 32 meters
Width 5 meters

INSECT COLLECTION DATA FORM

Page 2 of 4

Date/Time 3/20/97

Collector(s) RWK, BO, MC

Stream San Diego Creek

Sample Number SOC1

County San Diego

Township N33° 33-328' Range W117° 32-632'

Elevation 62'

04144428 E

369450 N

Weather Clear, Easley wind

Air Temp. 80°F Dry hot

Reach SOC

Comments

Algal mats were continuous throughout the reach, warmer water & possibly
↑ organic input from the STF upstream appear to have increased diversity here
This site is warm, slow flowing, & ↓ productivity seems to be thriving thus ↑ H. K. / abundance
and overall ↑ diversity values. Collected 10-15 Sanguinaria
3 Photos taken (1 of pool as sample site)

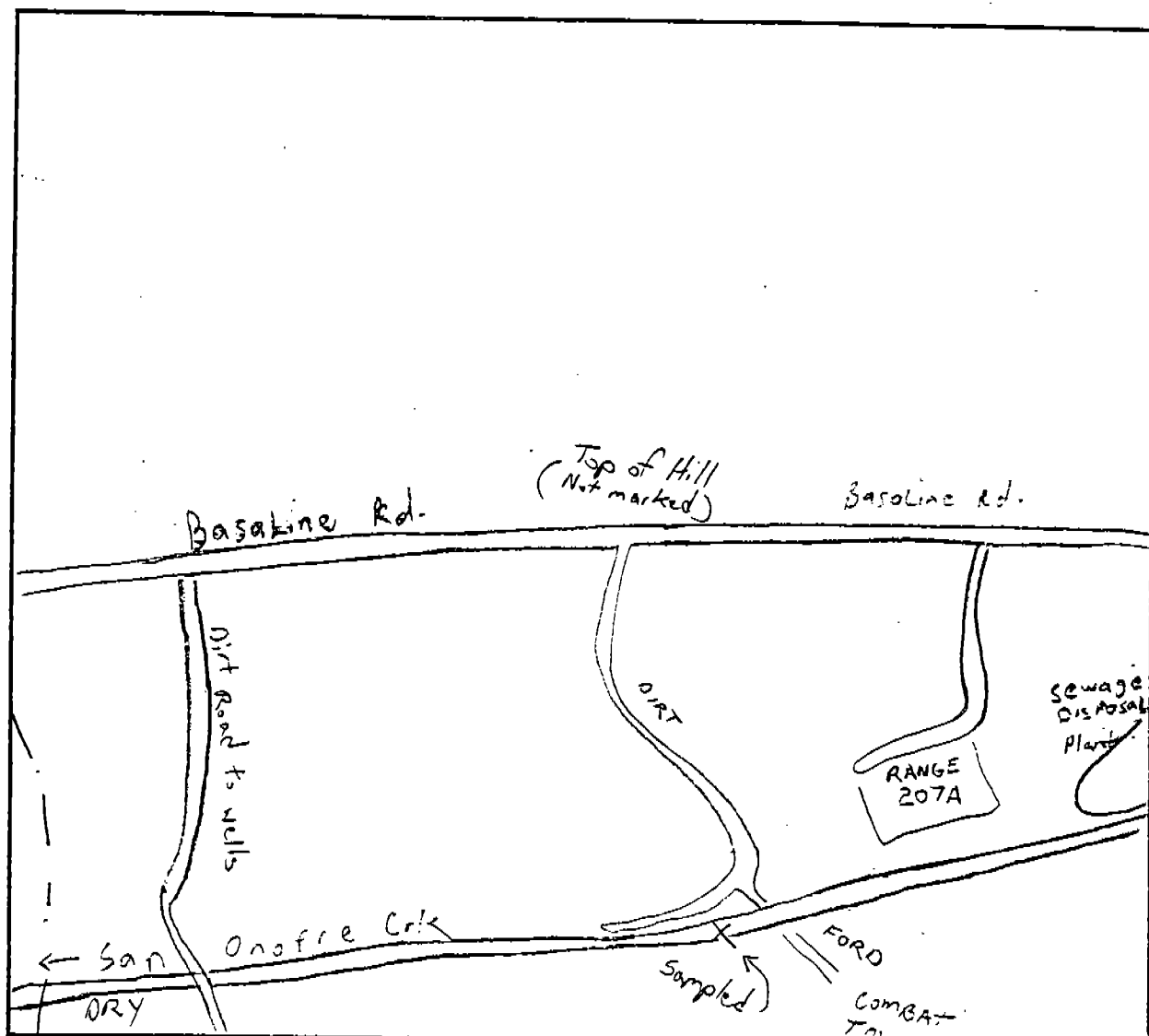
Hand Map of Stream location

Date 3-20-97

Author of Map MC

Field Crew MC. BO. RK

3/4



SOCI

Water quality and insect samples were taken $\frac{1}{2}$ mile downstream
of Firing Range 207A.

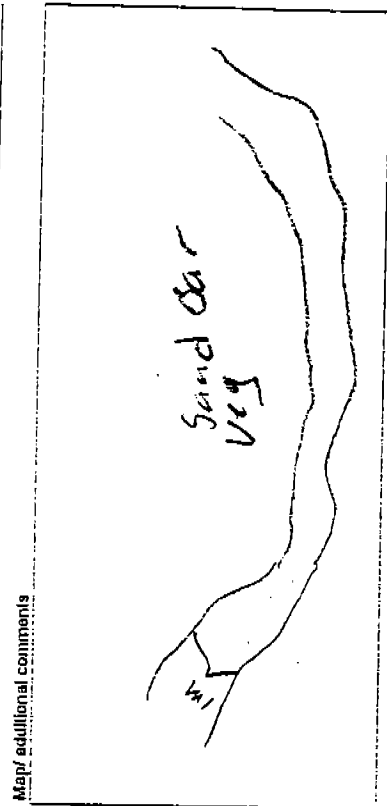
SOC-2

Water Quality - Field Data Collection Sheet

Date 3/20/97 Time 11:10 Weather Sunny Page 1 of 4
 Collector(s) RUK, m/c Air Temp 20.0°F
 Stream San Onofre South Fork below Horma Reach

SITE	TEMP	DEPTH	Ph	TIME	DO	mg/L	mg/L	mg/L	COND	TD5	SALINITY
A.	21°C	0.1m	6.8	1110	9.4	2.4	0.3	8.2	110	43	1 ppt
B.		0.1m								9/2	
C.		0.1m									
D.		0.1m									
		0.1m									
		0.1m									

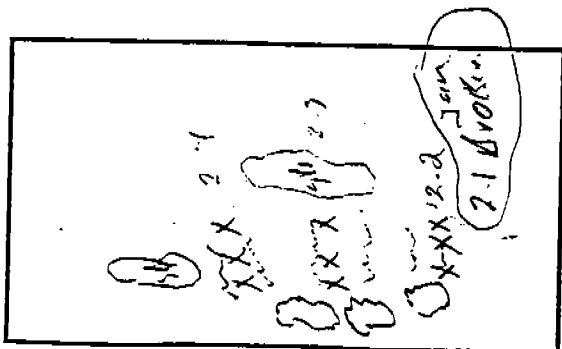
Comments
 a. Off Baseline road downstream of bridge leading to NBC Facility.
 b. Stream was very narrow. water was visibly less turbid than
 c. other (ie SMC lower sites) locations.



Lat. N 33° 22.875'
 Long. W 117° 29.147'
 Map drawing marked on airphoto ☒ YES ☐ NO
 Insects Collected ☒ YES ☐ NO
 GPS Reading ☒ YES ☐ NO
0454819e
3693664n
 Elevation 360 feet

SOC-2
~~SOC-2~~

Riffle Sample Locations



Length 9m
Width 1.6m

INSECT COLLECTION DATA FORM

Page 2 of 4

Date/Time 3/20/97 11:10
Collector(s) KK, BO, ML
Stream San Onofre south fork below Horno
Sample Number SOC 2.1, 2.2, 2.3
County San Diego
Township N38° 22.872' Range 117° 29.146'
Elevation 339 Feet

Weather Sunny
Air Temp 80° F
Reach SOC 2

Comments

Bedded stream channel, water is visibly less turbid than other sites (ie SOC 2.1) that we have sampled. Rocky substrate .5" to 1" size class, and smaller make up substrate. Embryonic was less than other sites mentioned above.

For 2.2 is sample 1 2.3 is sample 2 & 2.4 is sample 1
several water snakes & many adults

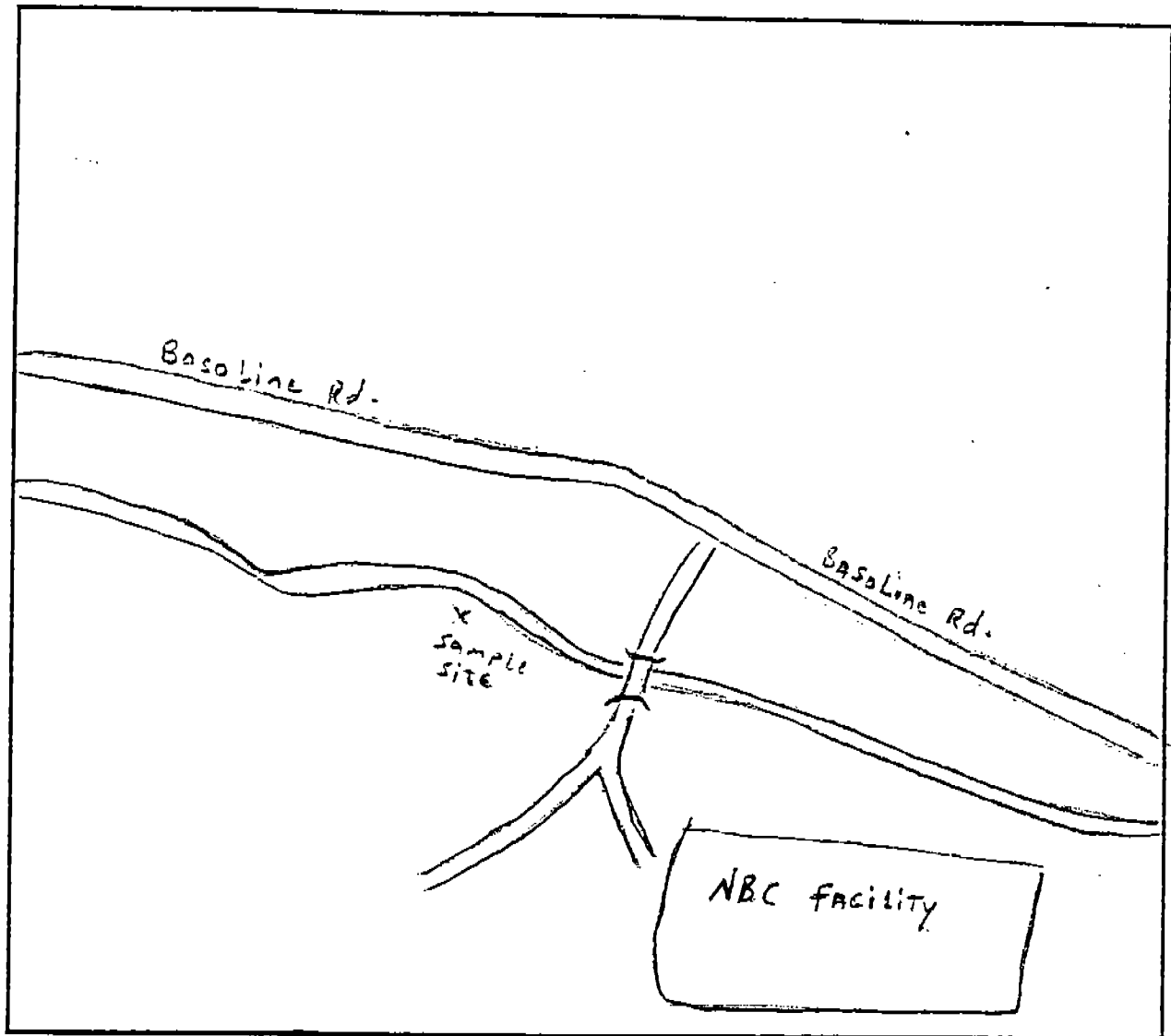
Hand Map of Stream location

Date 3-22-97

Author of Map MC

Field Crew MC, BO, RK

3/4



SOC2

Water quality and insect samples were collected
1/4 mile downstream of bridge off Baseline Rd. before
entering NBC Facility.

CAMP PENDLETON AQUATIC INSECT SURVEY

Watershed: SAN ONOFE

Date:

Page 4 of 4Location: SOC - 2

Sample site Tallies

Order: Family Genus Species

2.1

2.2

2.3

DIPTERATIPULIDAE

3

SIMULIIDAE

6

20

CHIRONAMIDAE

14

41

CHIRONAMIDAE (ALL OTHERS)

29

55

STRATIOMYIDAE

1

SYRPHIDAE

1

EPHYDRIDAE

1

4

EPHEMEROPTERABAETIDAE

6

4

3

ODONTACOENAGRIONIDAE

2

1

AESHNIDAE

2

4

GOMPHIDAE

1

2

MEGALOPTERACORYDALIDAE

2

D. SIDACOLEOPTERADRYOPIDAE (LARVAE)

3

4

8

(ADULTS)

2

1

4

ELMIDAE

4

4

2

DYTISCIDAE

2

6

2

HALIPLIDAE (LARVAE)

6

(ADULTS)

5

5

6

HEMIPTERABELOSTOMADIDAE

1

0

0

Soe-3

Water Quality - Field Data Collection Sheet

Date 3/22 Time 8:45
 Collector(s) RWK, MC
 Stream San Diego Creek
 Page 1 of 2
 Weather High clouds
 Air/Temp. 104° 70°F
 Pond Below Gase Springs buffer (near)
 NO. Invertebrates none
 here

SITE	TEMP	DEPTH	pH	TIME	ppm	mg/L	mg/L	mg/L	COND.	S-SOLIDS	TDS	%	SALINITY
					D.O.	NO ₃	NH ₄	PO ₄					
A	13.5°C	30m	6.2	8:45	8.1	2.9	.5		21	11	9/e		0
B		n/m											
C		n/m											
D		n/m											
E		n/m											
F		n/m											
G		n/m											

Comments

^ This pool was slow moving 1-2 ft/s to 3-4' deep. (under trees.)
 ^ 1st pool below outflow pipe.

Map/ additional comments



N 33° 17.02.74"
 W 117° 15' 20.34"

Map drawing marked on airphoto YES / NO
 Insects Collected YES / NO
 GPS Reading YES / NO

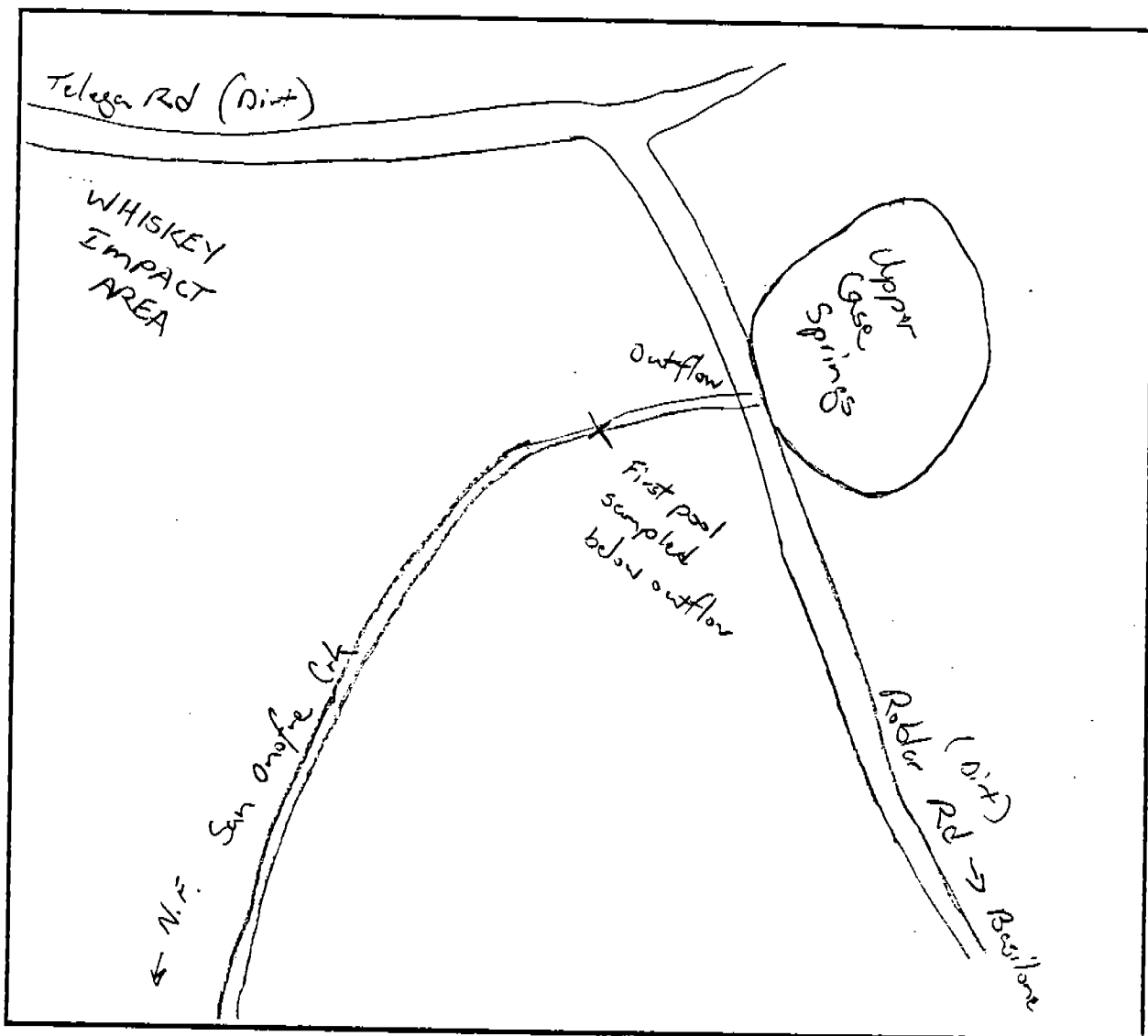
Hand Map of Stream location

Date 3-22-97

Author of Map MC

2/2

Field Crew MC, BO, RK



SOC3

Water quality samples were taken on the North Fork of San Orofre Creek about 25 yards downstream of Case Spring Outlet.

RC-1

Water Quality - Field Data Collection Sheet

Date 3/24/17 Time 9:25 Weather Cloudy morning clearing midday Page 1 of 2
 Collector(s) RNK, MC, BO Air Temp. 47.0°
 Stream Robber Creek above Peter's Confluence Reach RC 1

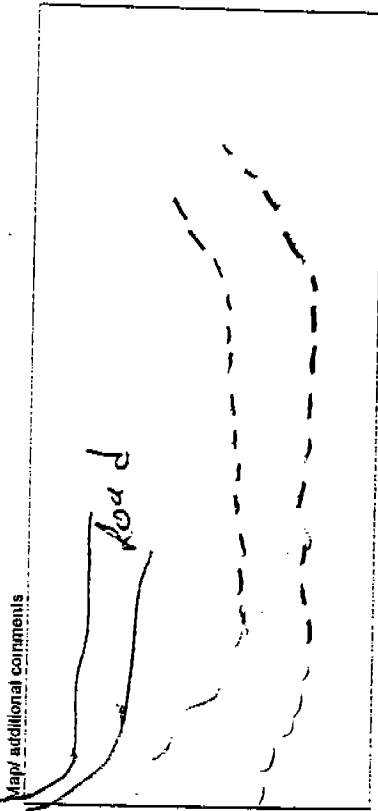
SITE	TEMP	DEPTH	PH	TIME	DO	NO ₃	mg/l	mg/l	PO ₄	COND	mg/l	SALINITY
A RC 1	22.5°C	0.5 m	7.5	11:50	9.6	2.01	NEG	4.0	7.0	2.0	8	
B		0.1 m										
C		0.1 m										
D		0.1 m										
E		0.1 m										
F		0.1 m										

Comments

A pH meter may be picking up again. All other meters are working well.

500 ft

Map/ additional comments



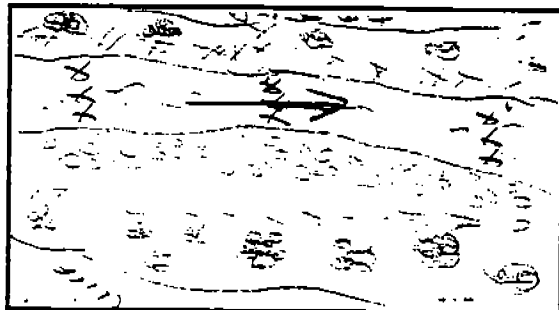
Lat. N 33° 23' 13.65
 Long. W 117° 14' 25.39
 Map drawing marked on airphoto ☒ YES ☐ NO
 Insects Collected ☒ YES ☐ NO
 GPS Reading ☒ YES ☐ NO

0469892e

3694250n

elevation 257

Rifle Sample Locations



Length 20 m
Width 2 m

Comments

Mosquito fish present, about 2 CFS

INSECT COLLECTION DATA FORM

Page 2 of 4

Date/Time 3-24-97 1043

Collector(s) MC

Stream Roblar Creek 1200 yards or more

Sample Number RC1

County San Diego

Township 0469250N Range 3694250N

elevation 257'

Weather sunny

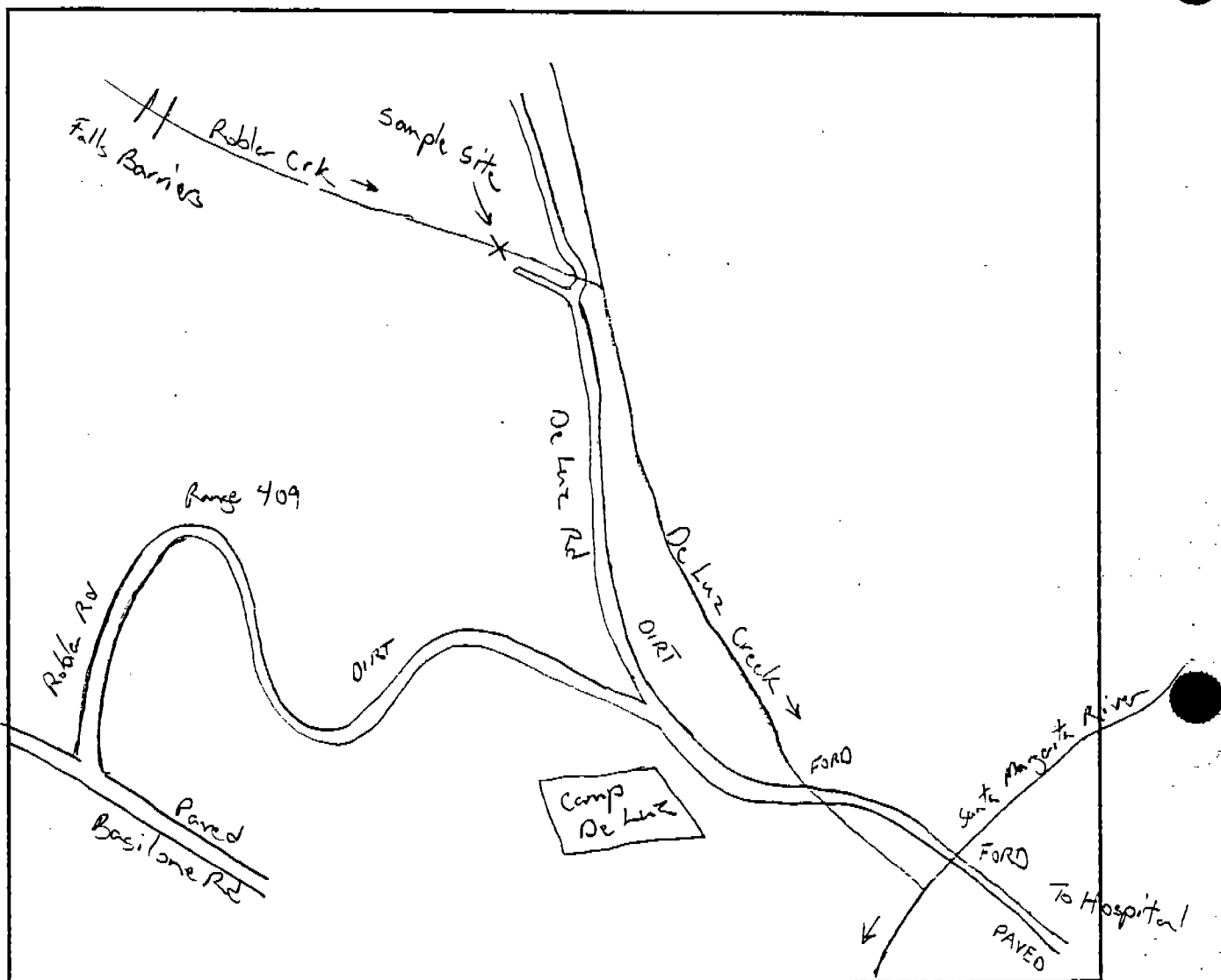
Air/Temp. 70's

Reach RC1

RC1

Author of Map MCField Crew MC, BO, RK

3/4



RC-1

RC 1 Took Robler Rd to De Luz Camp Rd to creek, but could have gone in behind hospital if Van would have made it across Santa Margarita River Ford.

Watershed: ROBLAR CREEKDate: _____ Page 4 of 4Location: RC-1

Sample site Tallies

Order	Family	Genus	Species	1.1	1.2	1.3
DIPTERA						
	Tipulidae			8	3	14
	Simuliidae			3	9	12
	Chironamidae			4	10	10
	Chironamidae (All others)			0	14	24
	Ceratopogonidae			2	2	1
	Syrphidae			1	0	0
	Ephydriidae			12	3	18
EPHEMEROPTERA						
	Baetidae			29	43	67
	Caenidae (Juvenile)			2	1	16
ODONATA						
	Coenagrionidae			11	0	0
	Calopterygidae			0	3	0
	Aeshnidae			1	0	2
	Gomphidae			4	0	3
PLECOPTERA						
	Perlodidae			0	2	3
	Nemouridae			12	5	4
TRICOPTERA						
	Hydropsychidae			5	4	24
	Hydroptilidae			2	3	0
	Rhyacophilidae			1	0	2
MEGALOPTERA						
	Corydalidae			1	1	1
COLEOPTERA						
	Dryopidae (larvae)			3	2	1
	" (Adults)			1	5	2
	Elmidae			2	0	1
	Dytiscidae			3	2	4
	Hydrophilidae			4	6	8
HEMIPTERA						
	Belostomatidae			0	1	0
	Corixidae			1	0	0

